THE PAPER INDUSTRY and PAPER WORLD

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TRADE WINDS

NEW ILLINOIS LABORATORY FOR CELLULOSE RESEARCH

Dr. Elbert C. Lathrop

▸▸▸ AN IMPORTANT STEP towards greater cellulose research development was taken by the Bureau of Agricultural Chemistry and Engineering of the U. S. Department of Agriculture, when that body established the Northern Regional Research Laboratory at Peoria, Illinois.

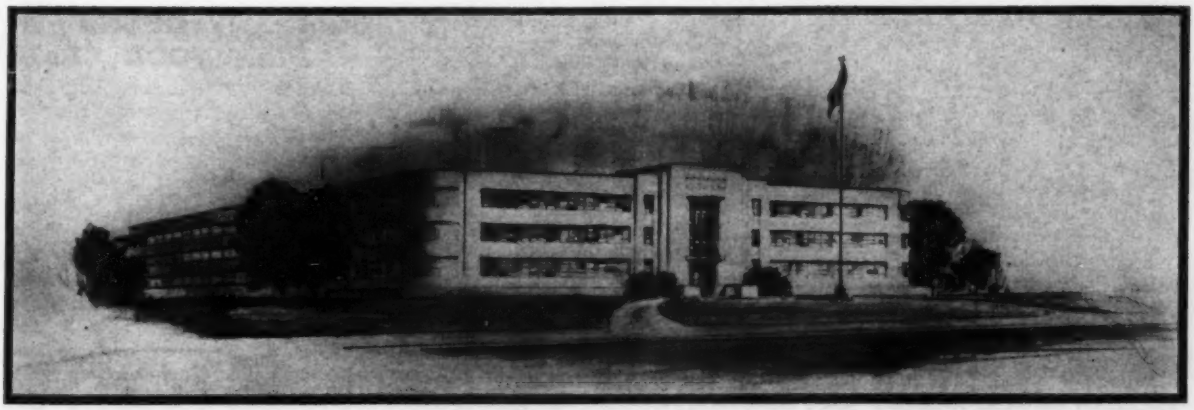
The new Peoria laboratory, one of four institutions set up by the Department of Agriculture, has a special significance for the pulp and paper industry because of the fact that one of its primary functions will be to develop new and improved methods for the production of cellulose from agricultural materials and also because the man in charge of this work is well-known throughout the pulp and paper industry—Dr. Elbert C. Lathrop.

The laboratory for the northern major farm-producing area includes the States of Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Ohio, Nebraska, North and South Dakota and Wisconsin. The laboratory will, in general, work on utilization of industrial wastes but much effort will be directed to cellulose research. In addition to directing this work, Dr. Lathrop will also make an important study of the use of agricultural waste materials for the production of insulating and structural materials.

Dr. Lathrop has been widely-known in chemistry circles for many years. A graduate of DePauw University in 1907, he has held important positions in the chemistry field with the E. I. duPont de Nemours Company, S. P. Sadtler & Son, Inc., the Celotex Corporation and the Crown Zellerbach Corporation. He is a recognized authority on the commercial production of cellulose products. Dr. O. E. May, an expert in research chemistry with the Bureau of Chemistry, is director of the Peoria institution.

In addition to the Northern Regional Research Laboratory, the Department of Agriculture has also established three other laboratories in New Orleans, Philadelphia and San Francisco. These laboratories will also be devoted to development of products from agricultural wastes.

The New Orleans laboratory will study cotton, peanuts and sweet potatoes and will be headed by D. F. J. Lynch, whose work on the development of a method of producing cellulose from sugar cane bagasse is well known. The Philadelphia laboratory will study tobacco, apples, Irish potatoes, milk products and vegetables and will be headed by P. A. Wells, while the San Francisco laboratory, headed by T. L. Swenson, will study fruits, vegetables, Irish potatoes, wheat and alfalfa.



Photograph from artist's drawing of Northern Regional Research Laboratory now under construction at Peoria, Ill.

NEW PULP AND PAPER MILL ANNOUNCED FOR FLORIDA

▶▶▶ INDUSTRY once again looks southward as news of the formation of another pulp and paper company is made known. Pensacola, Florida, is the scene this time of the newly-organized Florida Pulp and Paper Company which organization is to erect a $3,000,000 pulp and paper mill.

The new mill, which will manufacture white book and wrapping paper in addition to bond papers, is to be headed by James H. Allen, who recently resigned from the Union Bag and Paper Corporation (See Personals), A. D. Pace and J. C. Pace, brothers who have for years operated sawmills in the northwestern Florida area and who own some 95,000 acres of pinelands. Although the organization proper has not yet been set up it is understood that Mr. Allen will be president of the new concern while A. D. Pace and J. C. Pace will be vice president and secretary-treasurer respectively.

Architects and engineers for the construction of the plant will be selected during this month and the drawing of the plans will begin immediately afterward, according to Mr. Allen. It is hoped to have the construction under way early in 1940, possibly around the first of February. The plant, which will consist of a pulp and paper mill and a bleaching unit, will employ some 500 workers.

Members of the Pensacola city council are assisting officials in the procurement of a suitable site. Options on several sites have been obtained. It is said that the company will probably be located on the waterfront immediately adjacent to but outside the limits of Pensacola.

Mr. Allen has stated that 75 per cent of the necessary capital had been obtained and a market for the product had been arranged. He said he hoped to complete all preliminaries and be able to break ground by February 1.

SORG PAPER COMPANY MODERNIZATION PROGRAM

▶▶▶ THE SORG PAPER COMPANY of Middletown, Ohio, manufacturers for many years of fourdrinier and cylinder papers, with a daily capacity of approximately 250 tons, announces that they commenced a $250,000 improvement program about a year ago and that plans have been made for the completion of this program during the next year.

The primary purpose of this program is to insure the continuation of this company's position as one of the leaders among those mills making quality papers. Expenditures have been and will be made on all six machines that the company operates at Middletown, Ohio. Already the latest modern development in equipment for the cleansing of paper stock has been installed on the paper machines. Chlorination methods are being installed to meet modern demands for bacteria control. Automatic moisture control apparatus is being installed on machines making printing papers. Improved and additional refining machinery will be installed and the installation of special equipment for efficient and automatic handling of wood pulp in storage warehouses has been completed. Improved methods have been devised for the bulk handling of chemicals and other materials in the three mills embraced in the company property. A new smoke stack over two hundred feet high will be built for reducing fly ash from the centralized power plant of the company. Numerous additions and changes are being made in equipment in the finishing and other departments. Several new deep wells have been provided to assure an abundant water supply under the most severe conditions of drought. The manufacturing and technical departments have been enlarged to insure better control over the various papers manufactured.

Appropriations have also been made for distinctive advertising of the various products of the company. These products include a wide variety of standard grades of offsets, index bristols, post cards, high grade tag papers and numerous specialties. An infinite variety of papers are manufactured of rag stock, bleached and unbleached sulphite, soda pulp, bleached and unbleached sulphate, jute fibre and groundwood. With such a variety of raw materials available countless papers can be manufactured entirely of one grade or of several grades blended to meet certain conditions for specialty papers. Only the finest of raw materials are chosen for use in Sorg papers. The company has purchased some equipment and will purchase additional modern equipment for the conversion of high grade facial quality toilet tissue.

◆

KENNEBEC CO. TO REBUILD MILL

Construction of a $400,000 modern sulphite pulp mill on the site of the plant destroyed by fire last December was begun September 18 by the Kennebec Pulp and Paper Company of Augusta, Maine. Alfred Lund, general manager, stated that the new mill will be completed by next April. A machine shop, destroyed by the fire, will also be rebuilt. The Portland Company has contracted for the building of the digesters.

◆

I. P. CO. TO PROTECT PRICES ON NEWSPRINT

R. J. Cullen, president of the International Paper Company, has announced that the company is notifying its domestic newsprint customers that, taking advantage of inventories on hand, present prices will be protected without change throughout the first three months of 1940. While it is impossible under existing conditions to make any specific commitment beyond that date, it is hoped that a firm price for the coming six months will be reassuring to publishers and will demonstrate the company's desire to maintain an orderly market.

For the future, it was announced, prices for newsprint will be indicated just as far in advance as possible and will be made in the light of conditions as they develop.

◆

COMPANY OPENS PULPWOOD CAMP

The British Columbia Pulp and Paper Company has reopened the Spry Camp on the west coast of Vancouver Island, in order to supply pulpwood for the Port Alice mill, it was reported recently. The Port Alice and woodfiber mills are both operating at full capacity, producing 320 tons of bleached sulphite and rayon pulp daily. Officials state that elimination of competition from Germany and curtailments of exports of paper and pulp from the Scandinavian countries accounts for the increased demand for British Columbia Pulp products.

ADVERTISING PAGES REMOVED

Side view of machine and finishing rooms.

H & W MOBILE PLANT PROGRESSES

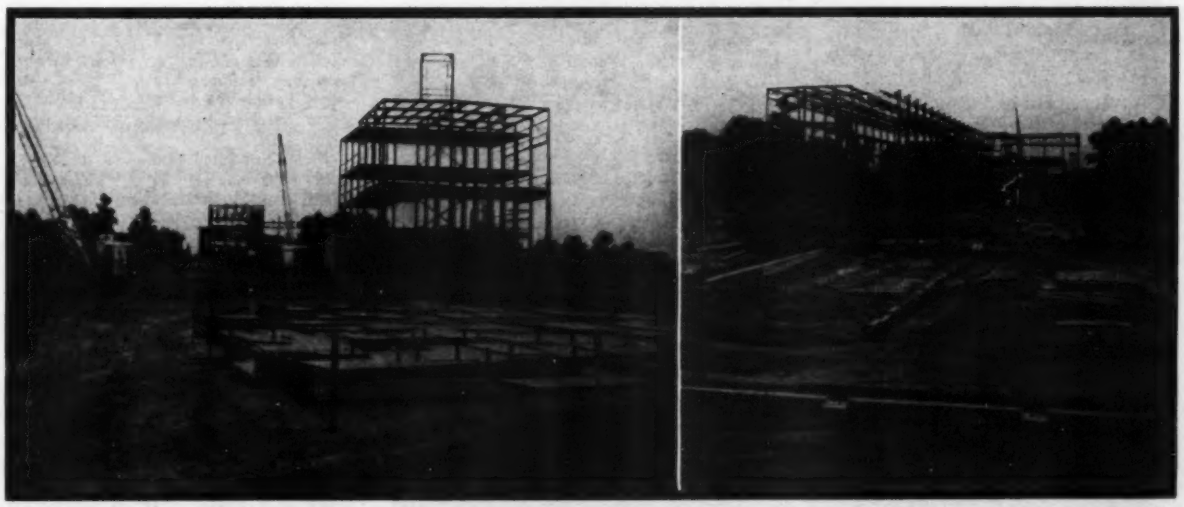
▸▸▸ THE MILL BEING CONSTRUCTED by Hollingsworth & Whitney at Mobile, Alabama, is ideally situated on the west bank of the Mobile River, about four miles north of the city. Shipping facilities are unequaled. Raw materials and finished products can be handled at the wharves on the river, which has sufficient depth for the largest ocean-going vessels. Ample rail connections are available; the Southern Railway and Louisville and Nashville main lines run on each side of the plant, also the tracks of the Terminal Railway which handles all freight to the Alabama State Docks. In addition, there are several main highways in the immediate vicinity.

The Rust Engineering Company, of Pittsburgh, are the contractors. The work is progressing very favorably, but it will be some time before things are in shape for the installation of the paper machines and other equipment. Two paper machines and one pulp drying machine will be installed.

Besides the 188-inch fourdrinier which is being built for the new mill it is understood that there will also be an 122-inch cylinder machine. The fourdrinier will trim about 164 inches, while the cylinder will trim about 112 inches.

The company's sulphate pulp production will include 100 tons of unbleached and another 100 tons of semi-bleached and bleached varieties. Production of the fourdrinier machine will be approximately 115 tons per twenty-four hours, while production of the cylinder machine will range from 50 to 60 tons per 24 hours.

The pulp will be bleached in the bleaching unit (building shown in one of accompanying illustrations) will be



Left—Bleaching unit in foreground—machine room in background (view from back of mill yard). Right—Machine room—looking South (view from bleaching unit).

made from poplar, tupelo, red, black and white (or sweet) gum, as well as pine, of which there is an unlimited supply within a radius of one to two hundred miles. Most of this timber is easily accessible by highway or by water on the Mobile, Tensas, and Tombigbee Rivers and the headwaters of Mobile Bay.

These different so-called "hard woods" have been found very successful when mixed with pine in the manufacture of wrapping paper, fourdrinier and liner board.

A steam generating plant will be included for operating the plant. This will be connected with the tremendous system of the Alabama Power Company for additional power if needed. The Alabama Power Company has started work on a five-million-dollar steam generating plant to furnish power to various factories in that vicinity.

Layne Central Company, Memphis, Tennessee, has contracted to drill twenty-five wells with a capacity of seven hundred gallons per minute each. A large filtration plant is proposed for construction on Chickasawbogue Creek, a tributary of the Mobile River.

It is only a few years ago that science invaded the South and predicted the future it held for our industry. Just as the Southland mill now almost completed at Lufkin, Texas, will be known as the first newsprint mill in the South, the Hollingsworth & Whitney mill at Mobile will have the distinction of being the first mill in the far South to make the finer grades of paper from native Southern woods.

Realization of the dream of making fine paper from Southern wood increases our appreciation of the fortitude of the men who have worked patiently to develop this great idea; men who were not afraid to gamble millions of dollars to build what already has become established as a permanent industry in the South. And to them, for the advancement of industrial progress and resultant employment, the South owes its thanks.

◆

BATHURST PLANS CAPITAL ADDITION

The Bathurst Power and Paper Company will proceed with plans for capital additions of approximately $400,000. Plans have been under way for a long time and were dependent on kraft liner board prospects and a long-term outlook as to general economic conditions. A considerable market has been developed in the production of corrugated cartons and with every indication of an expanding movement of package goods of all kinds, particularly processed materials, a bigger foreign and domestic trade is thought to be a certainty.

◆

FINANCIAL

THE breaking out of war in Europe brought to those interested in paper company securities a realization of the manner in which the world would be increasingly dependent upon American paper, together with the higher prices for paper which would result from the difficult position of the Scandinavian nations at the verge of the war zone. A rush of purchases brought increases of values seldom shown in the most hectic days of Wall Street trading.

The war demand is accelerated by other conditions, including the fact that this is the time of year when stocks are usually built up by merchants and consumers, and the added fact that without the war condition orders for paper were in such large volume that the mills are operating at from 85 to 90 per cent of capacity, on normal domestic business alone.

The manner in which the industry has been coming out of the depression is shown by the following recent financial reports by various companies:

American Writing Paper Corporation—Earnings for the six months ending June 30 were $36,447, as against a loss of nearly $85,000 for the same period of 1938.

Celotex Corporation—The earnings for the quarter ending July 31 totaled $436,000, as against $161,319 for the same period of 1938, and sales increased more than 50 per cent over the same quarter a year ago. The quarter's earnings followed a half year with total net income of only $11,000.

Continental Fibre Company—Net profit for the six months ending June 30 was $26,889, compared with a loss for the same period of 1938 of $437,126.

Crown Zellerbach Corporation—A net profit for the quarter ending July 31 is reported of $1,729,874, as compared with $970,055 for the same quarter of 1938.

Masonite Corporation—Net earnings for the year ending August 31 were $1,163,050, as compared with $1,144,274 for the preceding year, but the final quarter of the year accounted for over $450,000 of the year's total.

Nekoosa-Edwards Paper Company—A net income of $57,000 is reported for the period from January 1 to July 15, as against a net of slightly over $30,000 for the same period of 1938.

Paraffine Companies—Net profit for the year ending June 30 was $1,427,897, as compared with $1,255,001 for the preceding year.

Soundview Pulp Company—The year's total output will be 113,000 tons, as against less than 70,000 for the preceding year.

United Paperboard Company—The year ending May 27 showed a loss of $15,000 as against a profit for the preceding year of $37,000, but conditions have improved rapidly since the end of the fiscal year.

United Wall Paper Factories—The year ending June 30 showed a loss of $216,198, as against a net profit for the preceding year of $137,885.

West Virginia Pulp and Paper Company—Nine months' earnings ending July 31 were net $400,289, as against $231,782 for the same period of the preceding year.

New York Stock Exchange—Stocks

	Closing Prices Sept. 25	Aug. 24
A. P. W. Paper	3⅜	----
Celotex	10¾	8⅛
Same Preferred	*66–68	64½
Certain-Teed	7½	5½
Same Preferred	30⅜	23½
Champion P. & F. Co.	20⅛	17
Same Preferred	*100–102	100
Container Corp.	15½	9½
Cont. Diamond	8⅜	5
Crown Zellerbach	15⅞	9½
Same Preferred	90	*79–80
Dixie Vortex	11	9¾
Same "A"	32	32¼
Flintkote	18	16⅜
Robert Gair	5¼	2⅛
Same Preferred	15⅜	9
Gaylord Container	14¾	9½
Same Preferred	*41–43	*40¼–47
Internat'l P. & P. Co.	13¾	6⅜
Same Preferred	47¾	27⅜
Kimberly-Clark	35½	27
MacAndrews&Forbes	*33–36	*32–33
Masonite	35½	36
Mead Corp.	13¾	6¼
Same Preferred	*56	52½
Paraffine Co.	*41–43	39½
Rayonier	15⅞	7⅜
Same Preferred	23	*13–13⅜
Scott Paper	46¾	49
Same Preferred	113	114¼
Sutherland Paper	26	*24–24½
Union Bag & Paper	12½	6¼
U. S. Gypsum	72½	79
Same Preferred	*175–176	*175½–176½

New York Stock Exchange—Bonds

Celotex 4½%	76	----
Certain-Teed 5½%	74⅞	70¾
Champ. P. & F. 4¾%	102	101¾
Container Corp. 5%	100	100
Int. P. & P. Co. 5%	99	97¼
Same 6%	91	88½
Mead Corp. 6%	102	103⅞

New York Curb Exchange—Stocks

Am. Boxboard	9	5½
Brown Co. Preferred	22	8
Det. Paper Prod.	1⅞	⅞
Great Northern	43¼	*36–37½
Hummel Ross	5½	*2⅜–2¾
Nat. Container	10¼	*5–6
St. Regis	4	1¾
Taggart	4¾	2¾
United Wall Paper	2¼	1¾

*Closing Bid and Asked.

ADVERTISING PAGES REMOVED

"What Price Glory?"

▸▸▸ JUST WHAT WOULD YOU TAKE in cash for your United States citizenship? Have you ever thought of its value in just that sense of the word? In all probability none of us will ever be afforded the opportunity to renounce our rights as a citizen of the United States for a "cold cash" consideration. One man had this opportunity early this year—Frank Rusoti, Lee Paper Company employee of Vicksburg, Michigan, but he flatly refused to sell.

While an inmate last February of the Borgess Hospital, Kalamazoo, recovering from injuries received in an automobile accident, Rusoti was visited by the Italian vice-consul of Grand Rapids, who informed him that he was sole beneficiary of the estate of his father, who died January 13 at the age of 102 years in Castel Mona, Italy, leaving a fortune of no meager proportions. Learning the provisions of the legacy, one of which was that he must return to Italy and renounce his American citizenship, Rusoti lost no time in telling the vice-consul to communicate his rejection of the fortune. Concerning renouncing his American citizenship Rusoti at that time said:

"That I will never do! I would rather be a paper mill worker in Vicksburg, than to be king of Italy. I have definitely rejected the legacy. I prize my American citizenship too highly, and my American friendships too dearly to forsake the land which gave me, a poor and uneducated boy, the opportunity to make my way in the world and to acquire a home and a job. America has been kind to me, and I am proud that I had the opportunity to serve in her army during the World War."

The inheritance which could have been Rusoti's consisted of considerable real estate, cash and personal property, including one large hotel, several business blocks, two or three chateaus, and extensive farm lands in and near Castel Mona, Italy. Mr. Rusoti's father, Guy Rusoti, was a wealthy civil engineer who had supervised several large projects in European countries.

In refusing the legacy, Rusoti asked the vice-consul to seek an arrangement, if possible, whereby his fortune might be distributed to worthy charitable organizations, or to some American project carried on in Italy for the welfare of children, thus further demonstrating his love for this country and his fellow man. He does not know, however, if this arrangement can be made as yet.

After leaving the hospital, Rusoti returned to his job at the Lee Paper Company and his family in Vicksburg, putting all thoughts of the legacy from his mind. Dr. C. E. Osborne, Vicksburg physician, who had been attending Rusoti and who was present when the offer of the inheritance was handed to Rusoti, made the news public through a story carried in the local paper. This story was copied by most of the metropolitan dailies, and Rusoti was immediately flooded with hundreds of congratulatory messages from organizations and personal acquaintances. He virtually was swept from his feet by the recognition which came from near and far. He was referred to as the "outstanding American citizen" by many editorialists, and news of his act spread to the four corners of the nation.

Rusoti was the invited guest of many veterans' organizations and attended the convention of the Veterans of Foreign Wars this year, as an example of a "100 Per Cent American Citizen." He appeared on a nation-wide radio broadcast in New York City, where he was the guest of Mayor LaGuardia. The requirements of his job at the Lee Paper Company in Vicksburg has made it necessary for him to refuse many other invitations during the last seven months. The most recent honor conveyed him was the invitation given by the Cook County Council, American Legion. He was their guest at the annual national convention of the American Legion held in Chicago, Sept. 25 to 28, inclusive. The invitation was conveyed personally by Elliodor Libonati, chairman of the Americanism Committee of the Cook County Council of the American Legion.

"I pledge allegiance to the Flag of the United States and to the Republic for which it stands: One nation indivisible, with liberty and justice for all!"

Rusoti is a citizen of only average means. He is a home and family-loving man and shuns social activities. He has been active, however, in the American Legion circles and served as the commander of the Roy Canavan Post,

This picture of Mr. Rusoti in the orchard of his home at Vicksburg, Mich., was taken especially for "The Paper Industry and Paper World."

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551 Fifth Avenue, New York City

American Legion, Vicksburg, and has held many other offices in that organization.

He lives in a modest home, constructed mostly with his own labor, in a quiet residential section of Vicksburg. With the aid of his wife, and then his daughter, he has landscaped his premises, set out fruit trees, and keeps a flock of chickens. He raises a garden every year, and spends much of his spare time in further improving his home and grounds.

Rusoti came to the United States when but 9 years of age with a family that settled in Milwaukee, Wisconsin. He has made his own living since he was old enough to work, and for the last 17 years has lived in Vicksburg with his family. He has never returned to Italy, although he has several relatives living there, preferring to remain in the land of his adoption.

When the United States entered the World War, Rusoti was among the first to enlist for service. He served with Company A of the 26th Division of the American Expeditionary Forces and saw action on the front lines of northern France.

"Frank", as he is known by everyone in the little paper mill town of Vicksburg, has been an employee of the Lee Paper Company for the past 17 years, and is a trusted and highly thought of workman. He has this to say about papermaking and his part in the production, now being employed on the pulpers, "I like to feel that, although not having the education I would like, I still am helping to do a small part in the manufacture of an article designed to aid in the business and commerce of the world."

His genial smile is a characteristic thing about Rusoti, and his face lights up with it whenever any mention is made of his outstanding demonstration of the value he places on his rights as an American citizen, for he feels that he only acted as a true American citizen should.

SOME HIGHLIGHTS ON THE INTERNATIONAL SITUATION

▶▶▶ The American Paper and Pulp and other paper manufacturing associations are making every effort to prevent a runaway price market as a result of the war. An official statement from the American Paper and Pulp Association indicates a belief that too high prices at this time may result in a later drop, if speculative buying is permitted. It is coming to be a quite general practice for the paper companies to refuse any orders for those not its regular customers for more than thirty days in advance, and then only in limited quantities, depending on the usual requirements of the purchasers. Regular customers are being protected on their contracts, but sales in unusual excess over normal consumption are discouraged. There is little tendency as yet toward increases in prices, but the companies which have taken orders in the past scaled downward from the normal quotations are now insisting that purchases be made at the various company's usual price list quotations. Heavy commitments for more than thirty days are not as a rule being accepted.

The price of newsprint will apparently be $50 for the first quarter of 1940. International has announced that the present price will be continued, and it is assumed that other Canadian companies will follow the same policy. All customers of the newsprint mills have been assured that their requirements will be fully met.

Newsprint from Newfoundland paper mills, owned by British publishing interests, may be diverted in large quantities to the American market. It is expected that British consumption will be sharply curtailed by war conditions, both the limitation on the size of papers, and the fact that so many hundreds of thousands of readers are now in uniform, and not consumers of newspapers in the usual volume.

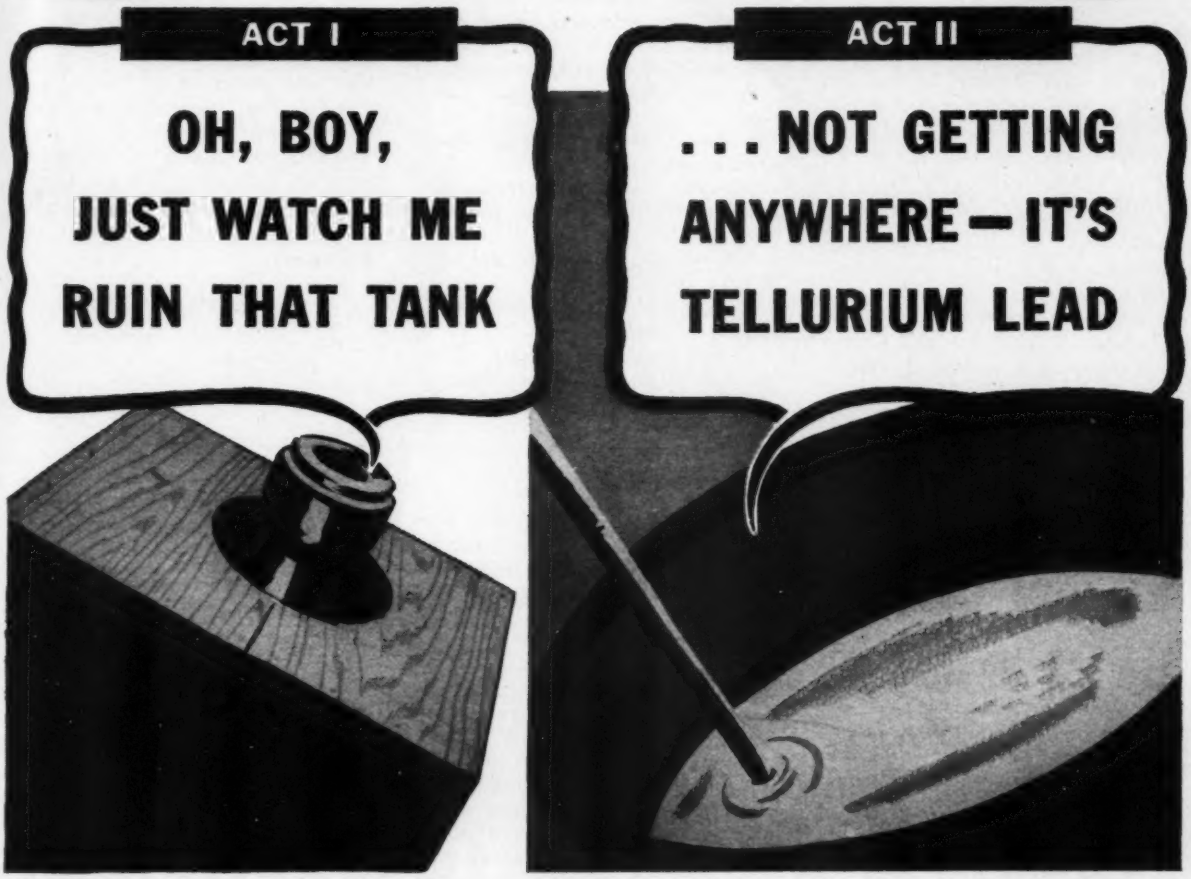
The depreciation of the British pound and the Canadian dollar will increase profits of the Canadian paper companies. Sales of newsprint at $50 in United States dollars is equivalent to an increase of no small figure in the proceeds in Canadian dollars. With the Canadian dollar at 88 cents, paper mills selling in American dollars will have the benefit of exchange which will make the return in Canadian dollars larger by the percentage of depreciation of Canadian currency.

The problem of many American paper mills who buy their pulp may be serious, though Scandinavian mills assure their customers that there will be no reduction in shipments. With Britain blockaded, it is even hinted that there may be larger quantities available for the American market. However, Finnish mills are understood to have announced an increase of $2 per ton in the price for pulp for the first quarter of 1940, and Norway and Sweden have announced the same increase for October sales, with no price fixed for the latter two months of the year. Added to any price increase is the increased cost of insurance and freight, which can be expected to be material, with the elimination of German ships as available carriers.

The American Paper and Pulp Association is organizing to meet any war contingency, so that whether the United States is eventually drawn into the conflict, the industry as a whole will be implemented for full co-operation with the United States Government officials in any contingency that may arise. The industry will function as a unit in any such matters as transportation, raw materials, or any other of the problems which followed 1914.

ACID MEETS TANK

A DRAMA IN TWO ACTS



TELLURIUM LEAD has starred in this acid-resisting role over and over again. In plant after plant, it has managed the acid-handling job better than it has ever been done before. From many different industries come user-reports telling how Tellurium Lead has prolonged the life of equipment and reduced the number of shut-downs for repairs.

Another highly important property of Tellurium Lead is this: *It toughens under stress.* When rolled, stretched or hammered, it actually becomes stronger. As a result, turnover points and joints are less subject to cracking. Furthermore, where vibration occurs, this capacity to develop latent strength minimizes buckling and creeping. It also gives Tellurium Lead improved resistance to fracture due to repeated heat changes.

Tellurium Lead of our manufacture is time-tested St. Joe chemical lead alloyed with a small quantity of tellurium. It gives the advantages of this well-known chemical lead plus important new ones. Yet now it costs only a fraction of a cent more per pound than chemical lead. Available in sheets, pipe and coils. For further facts, write our nearest branch.

Typical User Reports

"We lined one of our tubs with your Tellurium sheet lead. After eight months, there are no signs of the lead creeping and it shows very little, if any, corrosion due to the action of the 10% boiling sulphuric acid. It promises to have a much longer useful life than the lead previously used."

Another user writes: "Coils previously used gave comparatively short service (about six months). Tellurium Lead coils have been operating continuously 24 hours a day for a year. As yet no blowouts have occurred nor have any repairs been necessary."

• • •

NATIONAL LEAD COMPANY

New York, Baltimore, Buffalo, Chicago, Cleveland, Cincinnati, St. Louis; National-Boston Lead Co., Boston; John T. Lewis & Bros. Co., Philadelphia; National Lead & Oil Co., Pittsburgh; Georgia Lead Works, Atlanta; American Lead Corp., Indianapolis; Master Metals, Inc., Cleveland; The Canada Metal Co., Ltd., Toronto, Montreal, Winnipeg, Vancouver.

TELLURIUM LEAD

THE IMPORT SITUATION

▸▸▸ THE WAR in Europe will entirely disorganize the present trend of paper imports into the United States, to judge from the import records of the World War from 1914 to 1918, according to a survey of the situation by Warren B. Bullock, Manager of the Import Committee of the American Paper Industry. To what extent the trends of that period may be repeated in the present emergency can not be foreseen. However, some salient features of foreign trade in the 1914-1918 period may well be reviewed at this time. Imports of dutiable paper for the year ending June 30, 1914, were valued at approximately $7,000,000; there are no statistics showing the tonnage imported of many standard grades. During the calendar year 1918, the value of imports of dutiable paper totaled about $13,000,000, but of this amount nearly $9,000,000 was of cigarette paper. A rapid rise in the price per pound of imported paper is evident in all statistics which show tonnage of imports as well as values.

Wrapping paper imports in 1918 totaled approximately 4,000 tons, valued at $541,000, as compared with 1914 imports of 18,000 tons, valued at $1,028,000. Dutiable printing paper imports dropped rapidly in the first year of the war. On the other hand imports of all dutiable paper and paper boards, exclusive of cigarette, wrapping, coated and printing, increased in value in 1917 to the highest figure ever known up to that time.

In 1938, Germany, Austria, and Czechoslovakia furnished about 14 per cent of the total value of imported dutiable papers. It would seem assured that a very large proportion of this business will be excluded by war conditions, though in 1916 Germany was still shipping a considerable quantity of paper through the Allied blockade. Exports of most grades of paper from France and England showed practically no dropping off in quantity in 1916 as compared with 1914, and in some cases there were actually increased shipments.

Papers from abroad which continued to come to the United States during the 1914-1918 war period were as follows:

Austria-Hungary—Chiefly tissues.

Belgium—Parchment and fancy papers.

France—Drawing, carbon tissue, writing, and cigarette papers.

Germany — Imitation parchment, greaseproof, drawing, tissue, and tracing papers.

Italy—Tissue, hand-made, and bible papers.

Norway and Sweden—Pulp, shoe, and trunk boards.

United Kingdom—Writing, drawing, hand-made, bristol board, filtering, carbonizing, Bible, and high-grade tissue papers.

Japan—High-grade tissues, hand-made, vellum and text papers.

The customs officials at Washington will not allow the war to interfere with the normal investigation and action on cases of suspected undervaluation, misclassification and dumping, and the cases now pending will be carried forward as though there were no war in progress. Over one thousand cases initiated by the Import Committee are now awaiting trial in the United States Custom Courts.

Meanwhile, the Administration authorities who have been pressing tariff rate reductions have announced that despite the war there will be wholesale revision of existing reciprocal trade agreements, the writing of new agreements with countries with which no such agreements now exist, and the establishment of a general tariff policy to offset war eventualities, both during and after the war.

WAR RESTRICTS FOREIGN TRADE

Imports and exports of foreign nations are now subject to strict governmental regulation due to war conditions, it was revealed recently. Reports explaining some of the various decrees now in force by several foreign governments have been released by the United States Department of Commerce.

England

Great Britain has made absolute contraband articles falling in four general groups including: (1) all kinds of arms, munitions, explosives, chemicals or appliances suitable for use in chemical warfare, etc.; (2) fuel of all kinds; (3) all means of communication, and (4) coin, bullion, currency, evidences of debt, etc.

American business men were advised by James W. Young, director of the Bureau of Foreign and Domestic Commerce, that the British war trade restrictions now cover practically all imports. The restrictions apply to parcel post as well as to freight shipments.

"Since shipments are subject to either import licenses or exchange permits," Mr. Young stated, "exporters should make sure that these have been obtained by British importers before forwarding material to the United Kingdom."

Finland

The Finnish government has issued decrees which make it mandatory to have permits for the exportation of most products including newsprint, wood pulp, turpentine, pine and spruce logs, and lumber. It is reported that these specified commodities are made subject to permit in order that exports remaining can be directed to countries from which necessary products may be imported.

Sweden

Effective on September 11, the exportation of iron ore, iron and steel, lumber, wood pulp, newsprint, and other staple products from Sweden has been made subject to permit, according to a cablegram received from the American Legation in Stockholm. Lumber and wood pulp had previously been exempt from export restrictions imposed by the Royal Decree, August 29, 1939.

Netherlands Indies

The Netherlands Indian government, on September 3, imposed prohibitions on the exportation of various articles including paper, basic foodstuffs, soap, raw cotton, base metals, sulphur, phosphates, leather, rubber tires, rope, oxygen, cement, silver and silverware. No information is yet available concerning possible exceptions from these prohibitions.

Russia

An announcement was carried in the Soviet press recently that the Soviet Government has authorized the Peoples Comissariat for Foreign Trade to limit or prohibit the exportation of goods as well as the delivery of goods already shipped, from the Soviet Union to those countries of which the legislation, administrative regulations, administrative or legal practice, or established foreign currency limitations, create unfavorable conditions for the foreign trade of the Soviet Union.

Netherlands

The Netherlands Government has added 21 classes of essential commodities to the list of 47 classes of goods already subjected to emergency export restriction, according to a United States Department of Commerce report. Included in the new list are lumber, plywood, mechanical pulp and cellulose.

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ALKALI

Towering Landmark

This 100,000-gal. water tower topped by a giant roll of Scottissue, 150 ft. in circumference and 31 ft. high, is a part of the Scott Paper Company's recent $2,500,000 plant expansion program. It is a landmark which towers above all other buildings in Chester, Pa., where the company is located.

BRIEFS

▶▶▶ HEADQUARTERS OF Tested Papers of America, Inc., are now located in Chicago at the Carbide and Carbon Building, 230 N. Michigan Avenue. The marketing organization was recently formed by a group of 125 paper merchants to market nationally its own brands of trade-marked household and supply papers (cf. THE PAPER INDUSTRY AND PAPER WORLD, p. 642. Sept. 1939).

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▶▶▶ A VORTRAP MACHINE has recently been installed in the Linden division of the American Writing Paper Corporation, Holyoke, Massachusetts. The machine, one of the latest in the market for removing foreign matter from stock, is a part of the AWP improvement program undertaken in recent months.

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▶▶▶ CONSTRUCTION OF a new warehouse for the Portland (Oregon) office of the Zellerbach Paper Company is to be undertaken shortly. The contract calls for the modernization of a seven-story building the company purchased recently, and the construction of a modern warehousing plant on an adjoining lot. When completed the building will have 200 feet of frontage and will be 100 feet deep.

▶▶▶ THE BEVERIDGE-MARVELLUM COMPANY of South Hadley Falls, Massachusetts, is now operating under the name of the Plastic Coating Corporation. William J. Warner, president of the company, explained that the purpose of this change was to have a name that identified the company with the line of goods it produces.

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▶▶▶ IMPROVEMENTS ARE BEING made to the filter plant of the Rolland Paper Company's Mount Rolland (Quebec) mill including new settling basin, filtration equipment and accessories. The company has also been making improvements in the power plant of its St. Jerome mill.

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▶▶▶ FIRE GUTTED the groundwood mill of the Sidney Roofing and Paper Company at Victoria, B. C., recently. The groundwood unit is reported to have been completely destroyed.

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▶▶▶ CONTINUATION OF THE PRICE of $50 per ton for newsprint for the first quarter of 1940 has been announced by G. T. Clarkson, receiver and manager of Abitibi Power and Paper Company.

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▶▶▶ A NEW PAPER MACHINE has been installed at the Smith Paper Company, Lee, Massachusetts. It will be used in the Eagle mill, which already has two machines.

NEW ENGLAND PULP NEWS

So long as no one knows just what the situation is going to be in the Baltic Sea in the near future, pulp prices will continue a hit-or-miss affair, according to worried paper mill converters and importers in the New England area. Temporarily, most mills have enough pulp but the mortality in vessels of all classes, the new phase of the submarine warfare involving all pulp cargoes from Scandinavian countries to Great Britain which is expected to divert British demand to Canada, all have a serious aspect for American mills.

Recently confirmed business involved some Swedish kraft which was on spot at a New England port at $40 dock and a report that a Canadian mill had rejected a $40 f.o.b. mill offer for October-December kraft which would have netted them more than $40 dock equivalent. Scarcity of vessel space and delays to vessels that are allowed through the mine and submarine blockade from Sweden and Finland are expected to have a serious effect on the unbleached sulphite price level, of which the U. S. A. produces comparatively little for general market purposes. Buyers in New England were being asked $48 dock for spot unbleached late in September. Already New England mills have obtained $60 for spot bleached sulphite, though the converters who had contracts with the mills will receive their October-December shipment at the agreed-upon $50 price. In one case, a converter paid $65 to a New England mill for spot pulp, later, that mill withdrew from the market entirely. The same thing happened in the case of bleached kraft. The price was upped from $55 to $60, then to $65, and finally withdrawn altogether.

Several self-contained mills are operating pulp mill capacity hitherto idle, not only to take care of their own extra operations, but to get into the profitable spot market. At least two idle pulp mills have resumed production this month, contract was let for re-building another destroyed by fire and two more are expected to resume operations inside of another month.

There is hope that considerable Swedish pulp will be shipped by rail from the Swedish mills to Norwegian ports on the North Sea for trans-shipment to the United States. This would enable pulp movement to a limited extent through the winter, from mills normally tied up by ice conditions in the Baltic.

Editorial

ADVERTISING PAGES REMOVED

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ACHIEVEMENT

▸▸▸ THERE IS A NATURAL PRIDE in achievement. It is bred in every man, woman and child. Without it, the incentive that urges an individual to tackle a job and see it through to a successful completion would be lost. There would be little desire on the part of most of us to labor if it were not for the "joy of the working" that is crowned by successful achievement.

It is the job of THE PAPER INDUSTRY AND PAPER WORLD to chronicle some of the achievements of individuals within and without the pulp and paper industry—achievements that have a bearing on the growth and development of the industry of which the publication considers itself a part. Its printed pages are mute evidence of what has been accomplished during the twenty years of its existence and in a way may be likened to a scoreboard upon which the scores of each contributor are recorded. If it were not for the willingness of these individuals to give of their knowledge, accumulated through years of experience, research, or both, to the upbuilding of the industry, it is doubtful if the industry today could point to many of the achievements of recent years. Light hid under a bushel certainly does not illuminate the pathway; and individuals unwilling to pass on to others the results of their experiences do not contribute much to progress.

It is, therefore, with pardonable pride that THE PAPER INDUSTRY AND PAPER WORLD mentions an award that came to it recently as a result of the publication in its July, 1939, issue of the article, "Spots and Specks in Paper," by Murray M. Rubin and Milton L. Rubin. This article was entered in the Second Annual Competition sponsored by *Industrial Marketing*, a well-known publication for industrial sales promotion and advertising executives, as one of the outstanding articles published by THE PAPER INDUSTRY AND PAPER WORLD during the twelve-month period ending August, 1939. It became one of eighty-eight entries in a specific classification covering the best single article or editorial, and was selected by the Jury of Awards for the first award. (Illustration of plaque appears on page 726.)

It is the desire of THE PAPER INDUSTRY AND PAPER WORLD to share this honor with the two authors who made it possible and with all other contributors to the pages of this magazine.

Not in rewards, but in the strength to strive,
The blessing lies.
—Trowbridge.

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LET'S BE CAUTIOUS

▸▸▸ THROUGHOUT THE MONTH OF AUGUST, the paper industry was showing a continuous upward swing in tonnage volume. This was due to a continuous upturn in general business activity throughout the United States that month.

Then, came the week of the Labor Day holiday which fell on Monday, September 4, this year.

On Sunday, September 3, England and France declared war on Germany. Sunday and Monday holidays intervened. When business opened on Tuesday, September 5, everybody in the United States, it seemed, tried to buy commodities.

Some weeks have now passed since the declaration of war and we can get a peek at the records, which show tonnage orders, lodged with the mills, from all directions, have broken all records.

In the kraft paper division, the average for the month of August (four weeks) jumped from 82.5 per cent of capacity to 126.8 per cent of capacity for the month of September (four weeks), a percentum increase of about 54 per cent.

In the sulphite paper division for the four weeks of August, the percentum was 77.5 per cent of capacity. In the month of September, it jumped to 164 per cent of capacity average for four weeks.

Every other division of the paper industry witnessed similar record-breaking increases and in the sulphate board division, the week ending September 30 showed a 21 per cent increase in tonnage.

The grim truth is that no mill today has any open tonnage for current shipment, and the present situation is one where shipment, not price, is the primary consideration.

At first, it was thought by some wise operators that the buying was only a combination of hysteria and speculation, and that it would all "die down in a day or so." But, it continued for a week, then two weeks and for three weeks, and neither hysteria nor speculation fever lasts that long. The patient couldn't stand it anyway.

Now, we also have available the *Business Week's* figures for general business activity covering a good period of time and they show in part why buying has risen and continued high for the past month. Look them over:

	Per cent
A year ago	91.0
Six months ago	99.2
A month ago	101.8
The week ending September 23	115.0
The week ending September 30	118.8

Note first, that the increase in general business activity for the past month was 17 points and that the increase for the year is 27.8 points. In other words, the last thirty day increase was 61 per cent greater than the increase of the previous eleven months.

What caused it all? Three primary factors—abnormally low stocks of commodities in every position especially in paper inventories; a generally increasing business expansion for this fall; and third, the declaration of war.

Paper was a profitable purchase before the war was declared. It was generally selling at below-cost prices. Mills had been shading prices on paper products during the summer, and buyers generally were extremely leary when it came to ordering any stock whatsoever, even in face of an apparently expanding demand. When bingo! The war declaration, and then came the rains.

What's the answer? One man's guess is as good as another at this stage. Nobody knows. Pulp and paper prices will rule higher and higher as the war lasts. German submarines are now sinking neutral ships carrying pulp or paper. As a consequence, shippers will not take the risk and supplies will be harder to obtain.

The situation demands the utmost caution in operating in the market. Future commitments are extremely speculative. The general procedure at present seems to be on the basis of month-to-month pricing.

CURRENT THOUGHT

The National Resources Board expects a radical decline in the population of large cities—and sets the time for it at between 1945 and 1960. We have already observed this tendency (brought about by the automobile) and this trend will accelerate in speed during the coming years. Cheaper cars, cheaper fuel, high-speed highways have populated the "satellite" areas within the metropolitan districts—to the reduction of population in the slums and congested apartment areas.

All of which paints a picture of a population which may increasingly center its primary interests in the individual home. Leisure time; mature years; decentralization of population lead to the belief in the inevitable resumption of the dominance of home and church.

Still more than this, experts anticipate a sharp rise in the standards of both culture and health. Medical science will continue to progress in the matter of lowering the death rate of infants, as well as the stamping out of various disease scourges. Air-conditioning, which will presently become vastly improved and fully universal, will be an important factor in the contribution of better health. The advent of television will be a vital element in the lives of our people; perhaps even becoming their principal source of entertainment, education and news.

Education will be sought more seriously by both children and adults. Even now, the State of New York is considering the extension of the high school term from its present four years to six years. This means, after such a plan is widely adopted, establishing the equivalent of junior college education as the minimum standard for graduates from our public school system. Probably forty or fifty years from now most persons will have such an education.

Wars are terrible things. Each succeeding one is more terrible than those which went before. And they do have an arresting influence on the progress of civilization. But when you hear someone say, with long face and dour expression, that civilization is at the cross-roads and that we are headed for a dark age, tell him for me: "Aw Nertz."

DON'T SELL THE FUTURE SHORT . . . . . .

WILLIAM SIBLEY

▸▸▸ WITH THE ADVENT OF another European War, and with the danger of involvement for us which such a war brings, there are writers today expressing the belief that "civilization is in a decline" and that we stand at the threshold of another "Dark Age." To such lugubrious thoughts I, personally, reply (with considerable feeling)—"Aw Nertz." I, for one, am not going to sell the future generations short.

It is the concensus of opinion among authorities on population that life in the United States forty or fifty years hence will differ in several important respects from our present mode of living. For instance: it is inevitable that we will gain a continued increase in leisure time. A hundred years ago the standard working day was from "sun up to sun down." Fifty years ago, the working day was twelve hours. When I first went to work (pushing a wheelbarrow) for a contractor, the working day was from seven in the morning to six at night. Eight hours is the working period today. In the early tomorrow it will doubtless be no more than six. Improvements in manufacturing methods have had the dual effect of increasing wages and decreasing work. There is every reason to expect a continuance of this process, considered on the long range viewpoint.

More than this: should our birth rate continue its present declining tendencies (which authorities say it will), the distribution and character of our population will change materially during the next forty years. In 1930, only 23 per cent of our population was over 45 years of age. Experts say that by 1980 we will have a population in which 38 per cent (or more) will be in the older bracket. The whole tendency has been, and will continue to be, towards a predominately middle-aged and elderly population.

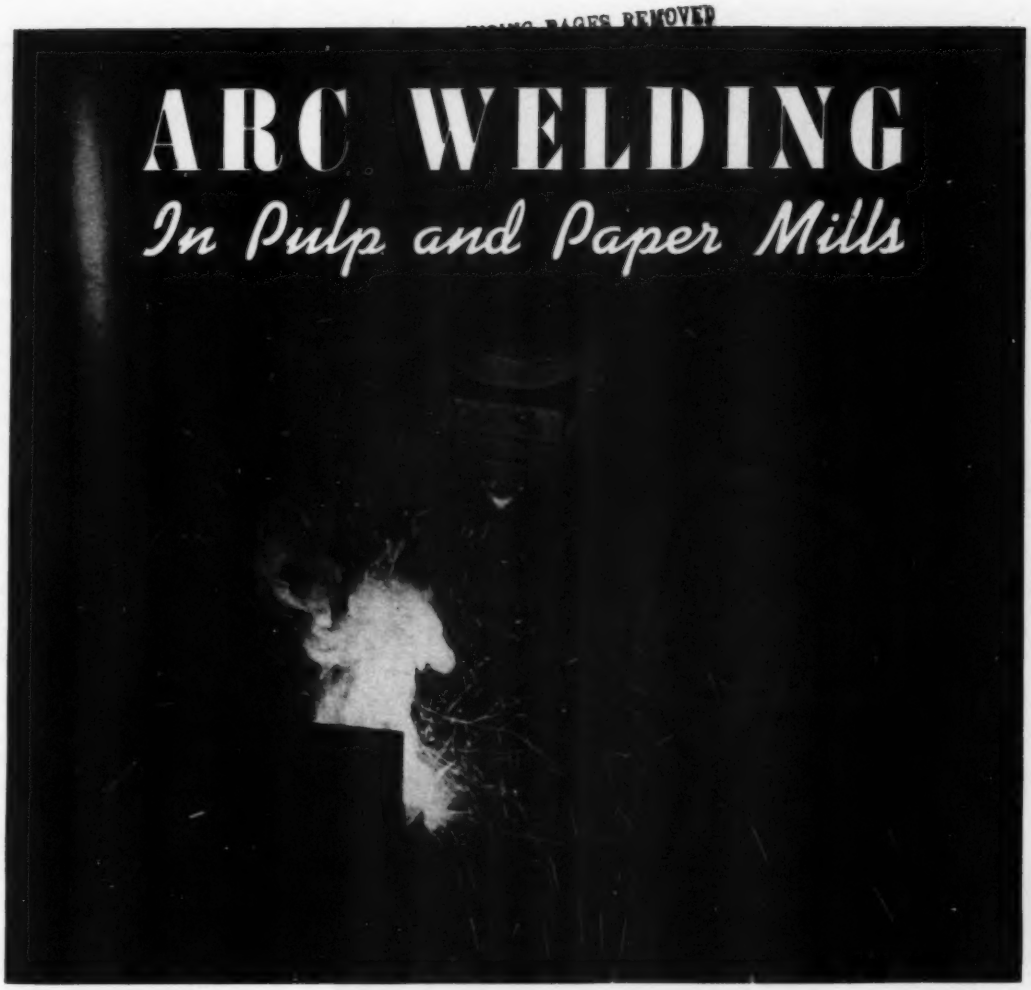
It Depends Upon Our Viewpoint

Walking down Michigan Boulevard the other day, I couldn't help hearing the conversation of two fashionably-dressed, and overly-groomed ladies. One of them said: "Oh, the ennui and unending monotony of life! Nothing to do—no place to go." Whereupon the other replied: "Yes—a week ago I visited the New York World's Fair and the tedium of the place nearly drove me crazy. Just nothing to do."

Turning the corner I almost collided with a little, old, and wrinkled lady, whose dress instantly stamped her as being a member of the Poverty Circle. Her face shown with happiness and her eyes were alight with the joy of being alive. From a crumpled paper bag she was feeding crumbs to the pigeons.

MISSING PAGES REMOVED

ARC WELDING
In Pulp and Paper Mills



H. S. CARD

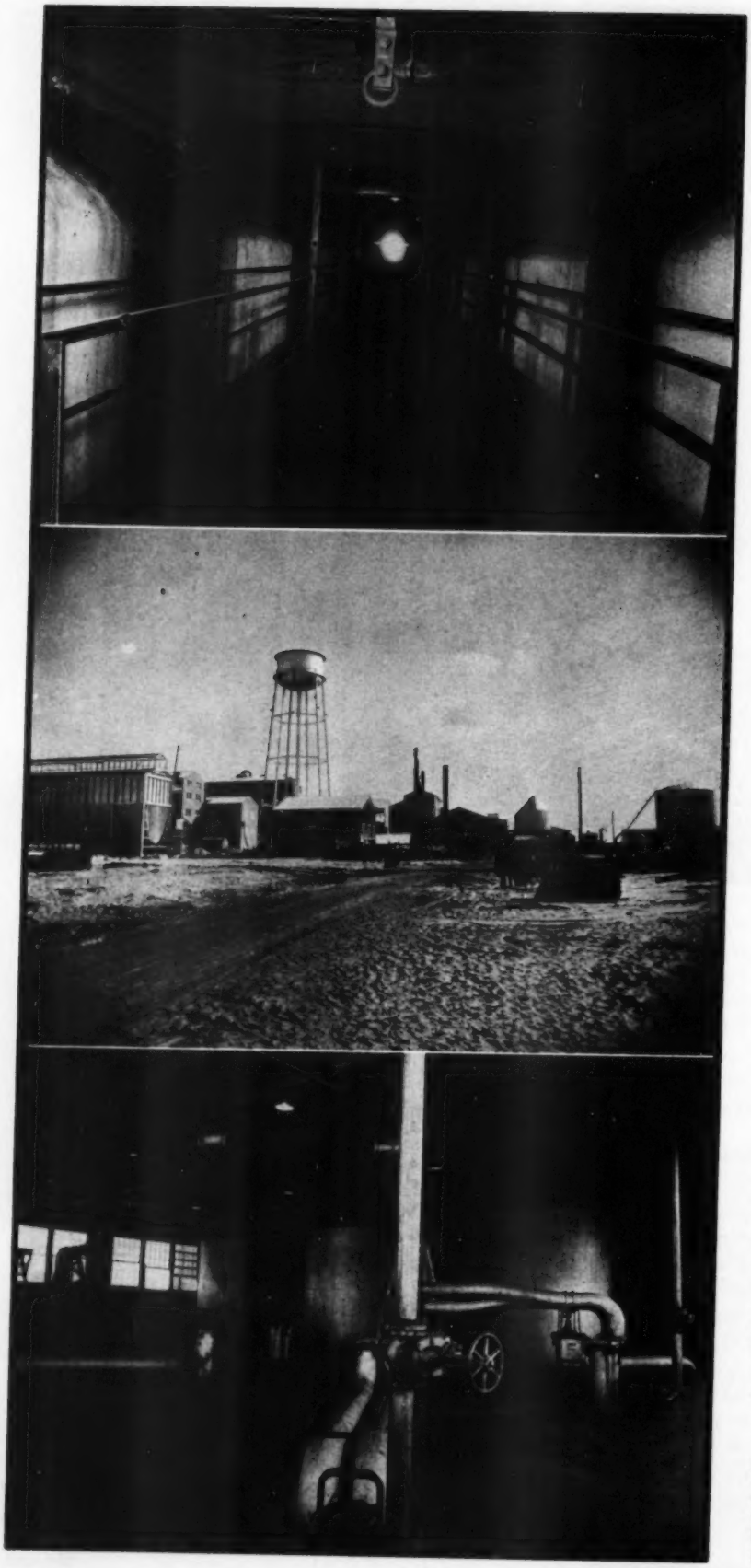
PAPERMAKING equipment, all the way from barkers to winders, does not embody many structural features that present unusual welding problems. The tendency toward a gradual extension of welded construction in this field reflects only a normally necessary time interval for new designs to be developed and to become effective. However, the containers and processing apparatus used in this industry are so subject to attack by corrosive agents that corrosion-resistant alloys must be used in place of the plain carbon steels that are satisfactory for the general run of mill equipment. Although these alloys are all weldable by both the metallic arc and carbon arc, they all differ in such important characteristics as heat conductivity, electrical conductivity, melting point, coefficient of expansion, etc., all of which call for variations in the welding technique. Therefore, the special problem in paper and pulp mill welding practice is to master proper techniques for all materials that are likely to be encountered, as has been done in the fabricating shops prior to the actual building of the machinery.

A conversion illustrative of this point occurred recently in the reception room of a prominent fabricating plant. A welding electrode salesman was asking for three weeks to make delivery on an order for a special wire. The buyer insisted that he must have the material sooner, and explained, "To meet the specifications on this job, the welders have to be qualified; and we have no welders qualified on this material. We have to get delivery at the earliest possible date so that we can qualify our men and get going."

Any skillful welder may think honestly that he is equal to the job of welding anything weldable, but there are few manufacturing plants serving this industry where he would be excused from the qualification test on his own recommendation, or anybody's recommendation, for that matter. The employer cannot afford to take chances where the welding of special alloys is involved. They are too expensive; spoilage carries too heavy a cost penalty. The penalty may be even more severe if an incompetent welding operator is set to work on maintenance or alteration jobs involving materials with welding properties with which he is not wholly conversant. A skillful welder may be hard to find, and it may cost a few dollars to prove that he is good, but certainly this will not be more than it is worth to be able to use the welding arc in all the places where it may be applied with profit.

How to qualify a welder is a question that has many answers. If the work welded comes under any code, or is subject to approval by an insurance inspector, definite testing procedures are specified and set down in black and white. The fact that sometimes these procedures include such an elaborate program of machining and laboratory inspection as to bring the total cost of qualifying a single welder up to three or four hundred dollars, indicates the meticulous care that is exercised in welding to meet code requirements.

Fortunately, it is not necessary to adopt all of these costly measures in order to check, to a reasonable degree,



the proficiency of a man for mill and factory welding. In this instance, the author is inclined to agree with those who accept the ability to make a sound deposit as satisfactory evidence of all-around ability. This is the basis of at least one shop's system of tests which has served the purpose admirably for several years and at very little expense. In the office of this firm, a record is kept, showing on a single sheet the dates when an employee has qualified for each separate operation. Tests are made only on the types of joints actually used in the plant and are recorded only when successful. Qualifying welds are first inspected for contour; i.e., undercutting, convexity, concavity, evenness, size of reinforcement, proper throat depth; then they are broken *through the weld** and inspected for soundness, i.e., freedom from gas pockets, slag, cracks, and laminations, burned metal or lack of penetration at the root. The management knows what strength to expect from a weld which is acceptably sound and, therefore, does not go to the expense of quantitative tests on machined specimens.

Fig. 1 (above)—Looking down between two rows of welded digesters after installation. Fig. 2 (center)—Welded storage for water, salt cake and fuel oil. . . . Fig. 3 (below)—Measuring tanks for black liquor and white liquor.

A few things concerning this simplified qualifying procedure should be observed very carefully. One is that the work is not subject to code regulation or insurance inspection. The second is that a well-informed management is able to control weld quality and to obtain welds practically equivalent to code quality without great additional expense. Costs are really lower than in the case of haphazard selection of welders, because practically no welds have to be chipped out and done over. Then, too, welders are tested only on the types of joints that are actually used in the shop with each metal, and only in the positions in which they will be expected to weld. Finally, the test pieces are required to be broken through the weld itself, and if the fracture occurs in the parent metal, it is no test. Experience with the system has demonstrated that it costs a whole lot less to get experience and to make tests on scrap pieces of metal than on parts of mill equipment.

(*) A nick sawed in the edge of the test plate, at the middle of the weld, will force a break through weld metal of a butt weld specimen. The lap weld will fracture if wedged apart and the T-weld can be broken by crushing or by a hammer blow on the reverse side.

Having suggested a minimum requirement for proficiency tests, it may be well to suggest further minima as to auxiliary shop equipment and managerial understanding of the processes used. As a preliminary, however, note the welded parts shown in the accompanying illustrations. They are attractively built, strong, truly formed, precise in dimension. Some of them have been stress-relieved and X-rayed to meet code requirements. There are only a few dozen shops which have the machinery it takes to build welded structures like them. Shears, plate bending rolls, oxyacetylene cutting machines for plate and for pipe, plate bumpers, bending brakes and floor plates seem a bit removed from the welding problem, but they play their parts in the preparation of material, which might otherwise take much more time than the welding itself. In all production work, economy dictates that facilities must be available to reduce the preparation time, and to do such a good job of preparing that good welding is made easier.

▶▶▶ Some examples of good welding are illustrated better than the term can be defined with words. Ten digesters 31 ft., 8 in. high and 8 ft. in diameter are shown completely installed in Figure 1. The shell plates are $1\frac{1}{8}$ in. thick and the bottoms are lined with medium chrome steel of low carbon content. These were all X-rayed and stress-relieved in accordance with the A. S. M. E. Code for Unfired Pressure Vessels.

Several excellent examples of large exterior welded structures erected at

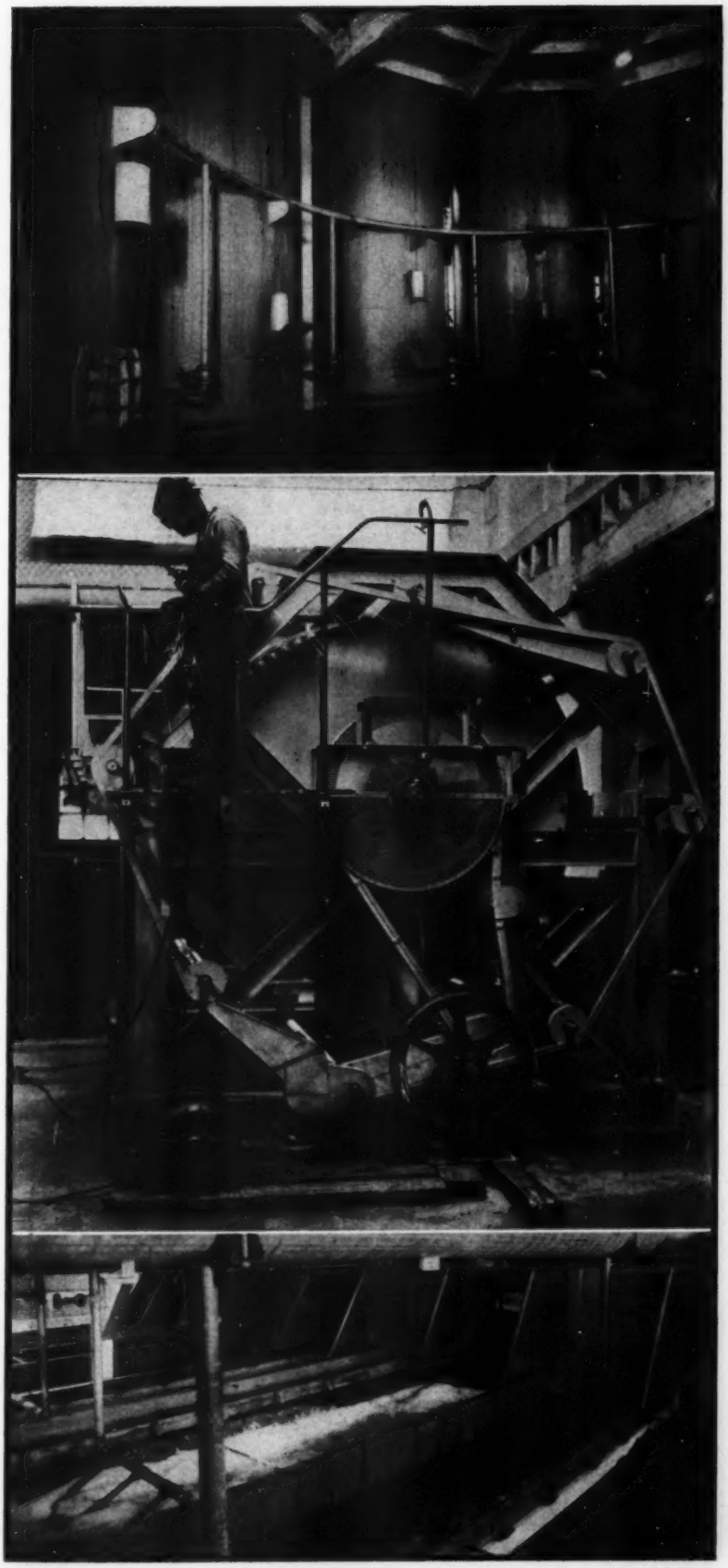
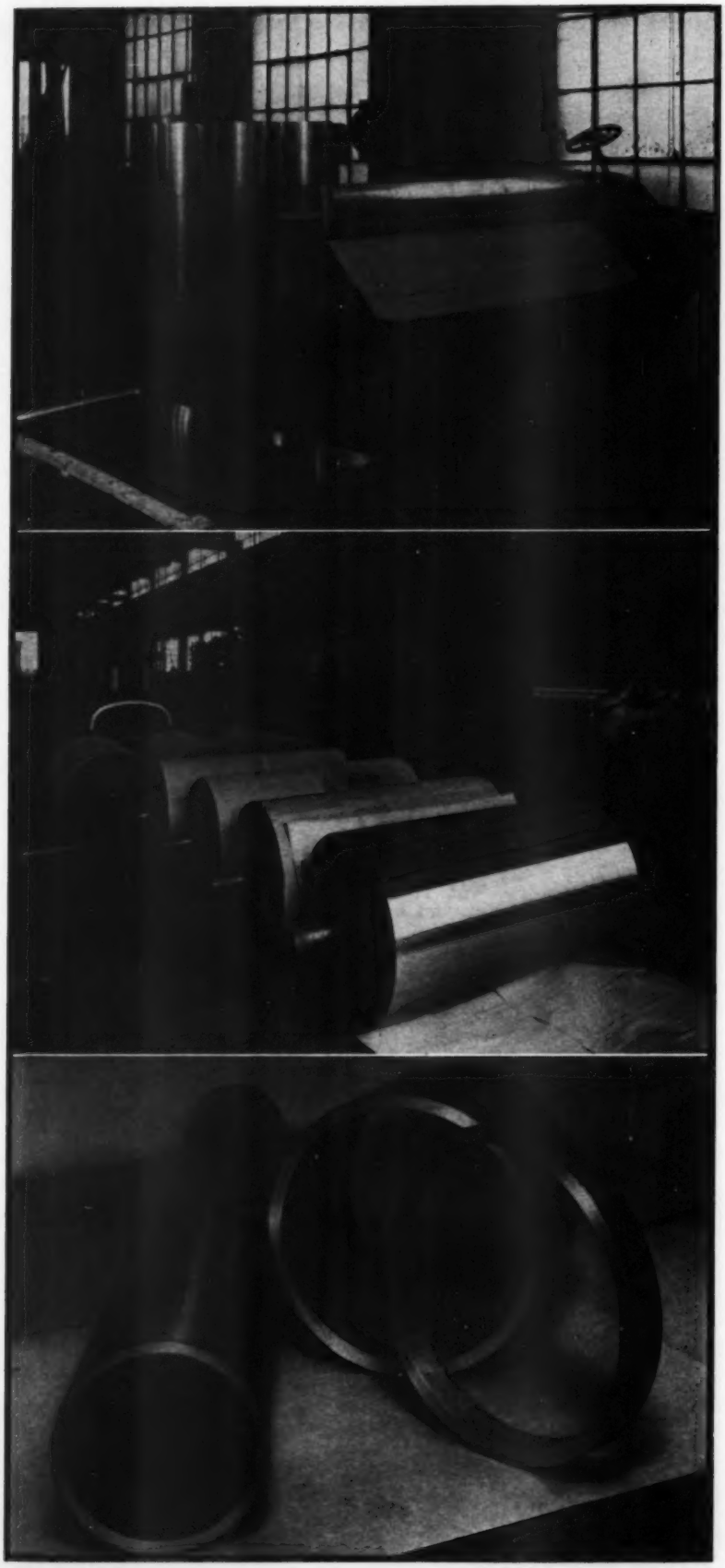


Fig. 4 (above)—Diffusers with welded fittings and welded piping. . . . Fig. 5 (center)—Welded rolled steel replaces castings in this machine and saves about 9.5 tons weight. Fig. 6 (below)—Monel arc welded pulp stock troughs.

the site are included in Figure 2. At the left, an elevated tank with ellipsoidal bottom, of 150,000 gallons capacity, provides water for general storage and fire protection. A novel and interesting feature of the design is that a 3-foot riser servicing the general water supply can draw from the top 50,000 gallons only, while a separate pipe connects the lower 100,000 gallons to the sprinkler system. The conical tops at the right of center identify three salt cake storage bins, 30 ft. by $50\frac{1}{2}$ ft. At the right is a 10,000-barrel fuel oil tank, $42\frac{1}{2}$ ft. in diameter and 40 ft. high, surrounded by a welded steel fire wall $87\frac{1}{2}$ ft. in diameter and 13 ft., 10 in. high. It is built over water on a concrete slab supported by piling. Here are three variously shaped structures in a group,



each of them calling for special procedures in forming and erecting. Today, they are commonplace to the welding industry. Fifteen years ago, they would have been rated as impossible to weld successfully.

Noteworthy examples of interior construction are shown in Figures 3 and 4. Figure 3 contains three measuring tanks, each 12 ft. high and 12 ft. in diameter. The two at the right are for black liquor, the other for white liquor. Note also the neat streamlining accomplished by welding on the piping system. Figure 4 is a good close-up view of a group of diffusers, 14½ ft. in diameter and 33 ft., 4 in. high, which shows the trimness obtained by welding on outlets and fittings.

Structural parts of mill machinery probably offer as many opportunities to use welding advantageously as do containers and flow lines. A single example of the economics of welding in this field is found in Figure 5, which shows a welder putting the finishing touches on a special paper mill machine. The frame as fabricated weighs about 10,000 lb. As first designed for a casting, it would have weighed about 24,000 lb. The interior mechanism weighs 5,000 lb. as fabricated, compared to 10,000 lb. if cast. Weight saving on the two parts was 9.5 tons, or 55 per cent. There was no pattern cost, no waiting for a pattern, and very little machining was needed. The operation which engages the welder here suggests numerous things that can be done around mill and factory with a good welding outfit and pieces of ordinary steel pipe.

Fig. 7 (above)—Forming sheets to cover paper mill rolls. . . . Fig. 8 (center)—Gleaming like jewelry, these Monel covered rolls are amazingly precise in dimension—a complete answer to the question whether distortion can be controlled. . . . Fig. 9 (below)—Monel covered aluminum rolls combine lightness with rigidity and high resistance to corrosion.

What equipment is necessary, or economical, to have in the mill welding shop depends upon the composition and the shapes of the parts to be welded. Recurrence of the same job is the best indication of the need for forming equipment and special jigs. One thing that ought to be considered indispensable is the chill bar for straight seams in sheet and light plate, together with angle irons, I-beams and stout C-clamps to complete the set-up. The purchase of these modest accessories is too frequently postponed. Nothing is a luxury if it can be used reasonably often to make welding easier or better.

An understanding of welding fundamentals by at least one plant execu-

tive is a prerequisite to successful application, and it need be neither difficult nor expensive. A couple of good reference books will make it possible to substitute experience for experiment. Further, for nearly every weldable metal used in pulp and paper mills, there is a good booklet available telling how to weld it. The producers of the alloys have seen to that. Each material has its own peculiarities, arising from differences in physical and metallurgical properties, but there are no secrets, no mysteries. There was a time when frequent mention was made of the problems involved in welding metals other than carbon steel. Now it seems more proper to speak of the special techniques which are used, and which are based on the known properties of the base metals. A few common metals will be considered from this viewpoint. To simplify the treatment, it is assumed that the reader has a general knowledge of the arc welding process as applied to ordinary steel

Monel

Light gauges of Monel will buckle just as steel sheets do during welding unless some preventive measures are used. Simple jigs with backing strips of copper will prevent this buckling. The most versatile form of jig utilizes a copper bar resting on one flange of a steel I-beam, the sheets being laid over the copper and held in position by suitable lengths of iron angles, and the whole assembly secured by C-clamps. A shallow groove cut in the backing bar so as to lie directly beneath the seam allows complete penetration and effectively molds the deposited metal on the reverse side of the weld. Incidentally, copper backing bars are recommended for use in welding the other metals, including steel, which are commonly used in the mill.

For metallic arc welding of Monel, it is necessary to use heavy coated Monel electrodes made especially for it, to hold a very short arc, with the electrode positive, and to hold the electrode nearly normal to the pool and pulling the pool along rather than pushing it, so as not to push the melted slag from the coating ahead of the pool and over the unwelded seam. A slight weaving motion is preferred on thicknesses of ⅛ in. or over. Current adjustment will have to be made to suit the immediate conditions. With proper adjustment, a sound non-porous weld can be made. If the crater boils and sparks excessively, current must be reduced or the weld will be porous. The following table gives the ranges of current values for the electrode sizes commonly used, and will serve as a guide in making the initial adjustment:

Electrode Diameter	Sheet Thickness	Range of Current
5/64 in.	20 to 16 gauge	45 to 55 amp.
3/32 in.	18 to 12 gauge	50 to 70 amp.
⅛ in.	13 to 9 gauge	65 to 85 amp.
5/32 in.	⅛ in. to ½ in.	80 to 145 amp.

If practice welds are made on scrap pieces in order to determine the most favorable welding current, scrap should be set up in the same jig and with the same backing bar as will be used on finished work.

Carbon arc welds of very good quality can be made in the medium gauges of Monel, though they will as a rule be slightly lower in tensile strength and ductility than welds made with the metallic arc. Small diameter carbons are used, and connected to the negative

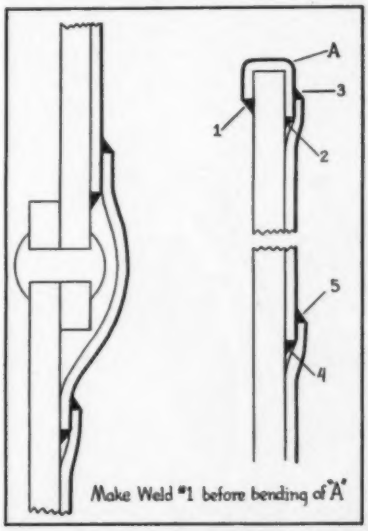


Fig. 10—Applying stainless clad steel linings to tank surfaces.

terminal of the welding machine. The carbon is tapered 2 in. or 3 in. to a rather sharp point, and gripped by the holder about 4 in. from the tip. If a filler rod is to be used, a special lightly fluxed Monel wire is made for the purpose. Instead of striking an arc, a better start is made by holding the tip of the carbon in light contact with the work at the starting point for about 10 seconds, then withdrawing it 1/16 to ⅛ in. to produce the arc. Slant the electrode from 30 to 60 degrees in the direction of the advance and hold the arc gap slightly below ⅛ in.

Welded Monel tanks and vat linings for processing and storage, piping and pipe fittings for flow lines, are quite common. A job peculiar to pulp mill requirements is the welding of troughs for carrying the flow of sulphate pulp to and from screens and to stock chest (Figure 6). In one mill, three of these troughs were made from 16 and 18-gauge Monel sheet. They were 26 in. wide, 24 in. deep and 60 ft. long. About 500 lineal feet of welding went into the construction of them. It was all done at the paper mill.

A more complicated operation is the application of Monel sheet to many varieties of rolls. Features of these rolls are high corrosion resistance and a reduction of sag and whip in the rolls, plus the vitally important structural feature of reduced weight. A patented process has been developed for covering both new and old rolls. It requires special equipment and procedures, and results in one of the finest examples of welded fabrication that the author has seen. The high perfection and precision of the finished work are almost unbelievable, yet these qualities are the rule rather than the exception, and the total production volume in the course of a year is impressive (Figures 7, 8, and 9).

Monel welding possibilities about the mill are linings for diffusers, wash pans, digesters and stock chests. In the case of the heavier vessels, this may seem a bold suggestion; but it need only be qualified by the remainder that the need for skilled workmen and engineered control increases directly with the importance of the work. Fabrication which can be done at the mill will run mostly to piping and pipe fittings and sheet metal work such as save-all pans, size troughs and stock troughs.

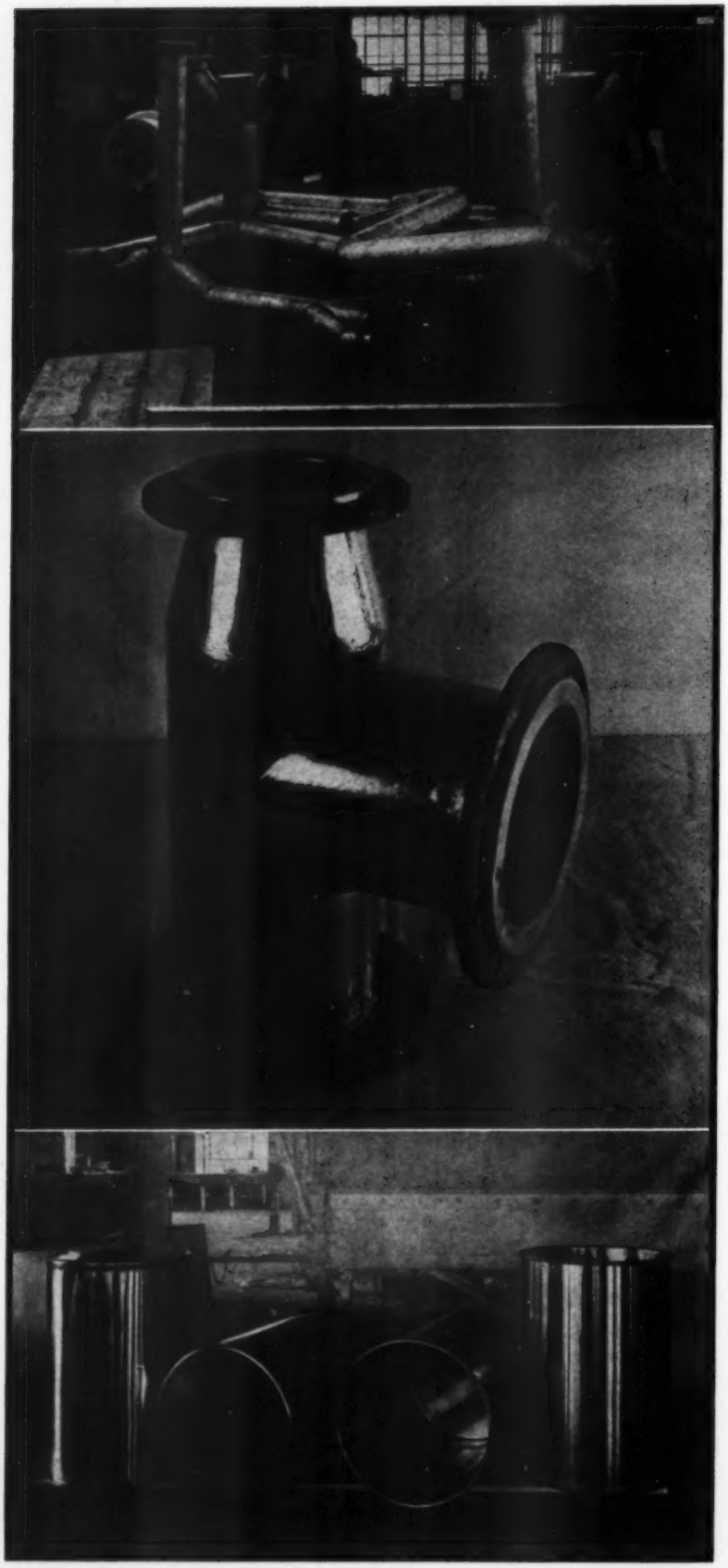
Inconel

This alloy, which contains about 79 per cent nickel, 13.5 per cent chromium, and 6 per cent iron, has high physical properties at elevated temperatures and excellent resistance to corrosion by fatty acids, making it useful for the fabrication of distilling apparatus. Metallic arc welding is accomplished readily with the heavily coated Inconel electrode, electrode positive, and a short arc.

On account of the relatively high cost of Inconel, its use in the form of a clad steel is usually preferred. General suggestions for welding the clad steels are noted later. A promising possibility is the lining of steel equipment for the sulphite process.

Nickel

Techniques and procedures for welding nickel do not differ materially from those recommended for Monel. Nickel is used extensively for cladding the exposed surfaces of steel plate forming the bottoms of sulphate pulp diffusers and for soda process wash pans; and pulp mills make use of all-nickel construction for evaporators for the recovery of pure caustic.



Everdur

Copper-silicon alloys can be welded in the flat position with the metallic arc, using electrodes of the same composition and with the electrode positive. Much higher current values are used than for bare steel electrodes of the same size. A small amount of flux (90 per cent fused powdered borax with 10 per cent sodium fluoride) dusted on the work will help the flow. Peening each bead soundly with an air hammer as soon as it is laid, and lightly annealing the final bead with a gas torch, will improve the ductility.

With the metallic arc, the metal flows freely in large drops and requires considerable skill to control; therefore, the carbon arc method, using a filler rod of the same composition as the base metal, is more often preferred. The carbon electrode is made negative and held nearly perpendicular to the work, with a slight inclination toward the finished weld. A short arc gap, a small pool and low voltage (20 volts) are all helpful to the rapid advance which is desirable with this alloy. A small amount of flux on the work is beneficial. The filler rod is best held

Fig. 11 (above)—Welded pipe fabrication in stainless steel. . . . Fig. 12 (center)—Everdur pipe fitting welded by the carbon arc. . . . Fig. 13 (below)—Alum size tanks of ⅛-inch Monel sheet.

at a low angle, inclined toward the beginning of the seam. It is even practicable to lay the rod in the seam and fuse it by drawing the arc along over it.

The copper-silicon alloys lend themselves quite readily to the fabrication of many types of pipe fittings used in the mills, and such mill equipment as head boxes, flat screen frames and linings for wooden head boxes, vats, and similar units.

Stainless Steel

Only the chromium-nickel-iron alloys generally classified as austenitic stainless steels can be considered in this brief treatment. They are commonly called 18-8, but may contain larger proportions of both chromium and nickel. If one has any freedom of choice as regards parent metal, a carbon content of .08 per cent maximum should be specified for parts to be welded. Reduction of the carbon below this maximum will be helpful to the final result. The bugbear of stainless steel welding is not that there is any difficulty in getting a good sound weld, but, rather, the danger of carbide precipitation in the *parent metal,* near the weld zone and roughly parallel to it. The formation of chromium carbides along the grain boundary lines not only weakens

the parent metal, but also lowers its resistance to corrosion. The phenomenon will occur where the parent metal has been heated to a temperature of from 1100 to 1500 deg. Fahr. and cooled slowly. In some services, the effect is entirely negligible. When service demands that full strength and corrosion resistance be preserved, carbide precipitation can be prevented by

1) Reheating the whole piece above 1900 deg. Fahr. and quenching so as not to allow time for the carbides to form, or

2) Following the electrode with a quenching stream of water, or

3) Using base metal and electrodes containing so little carbon (.07 per cent or less) that a harmful amount of carbon cannot form, or

4) Using base metal and electrodes containing stabilizing elements as columbium, titanium and molybdenum, the latter being especially effective in preserving the corrosion resistant property.

There need be no concern about carbide precipitation in the weld itself, because the fused metal is normally chilled too quickly to allow it.

Choice of electrodes is reasonably wide, for there are a number of reliable makes on the market. Real economy will dictate the selection on a basis of performance without regard to the selling price per pound. The electrode is made positive and current is adjusted for only enough heat for smooth flow and good fusion, about 20 per cent less amperes than for the same size electrode in mild steel. The electrode is better advanced without weaving. The tendency to buckle is greater than in steel, and this should be provided for in preparation of the work whenever possible. Use of flanged heads butt-welded instead of corner welds is a great help. Jigs with backing bars help on the longitudinal seams. A fair alternate is the tack welding of long seams, about two inches between tacks, on the reverse side. Electrode stocks should be protected from dampness, and if they do become moist, should be thoroughly oven dried before using.

Applications of stainless steels are found in containers, piping and pipe fittings, plus numerous miscellaneous parts as strainers, doctor blades and target plates. Pulp digesters of experimental size have been welded of chrome nickel steel, and there is some thought that full size digesters of either stainless or stainless clad construction can be expected in the future.

Cladded Steels

Steel plate, which has a thin veneer or cladding of nickel, Monel, Inconel, or 18-8 has the advantage of using low-cost steel to provide strength with only enough of the expensive metal to protect the surface that is subject to attack. There need be no difficulty in obtaining a perfect weld in any of these combination materials, provided the operator is skillful at changing his technique as he goes from one metal to the other. The best general rule is to tack weld on the steel side first and weld the steel side with a good steel electrode, chip out a slight groove on the clad side of the butt joint with a round nose chisel, then weld the clad side with an electrode to give the same composition as the cladding. Avoid chipping down unnecessarily into the steel before welding the clad side, not only because it is a waste of expensive material, but also because the steel tends to dilute the alloy. Chip the full depth of the cladding and just enough more to provide a smooth, clean, bright surface against which to make the final deposit.

The growing popularity of clad steels suggests the possibility of lining containers that are already in service in order to protect them from further corrosion. This has been done with light gauge stainless clad steel and with good success when there were workmen available who combined first class mechanical ability with welding skill. Since all the welding will be done on the clad side, the electrode used will be of that composition. Lap fillet welds are used throughout. When a riveted or welded seam has to be crossed or a corner turned, it is better not to attempt shaping a large sheet, but to cut the sheet back of the irregularity and form a narrow strip to weld in over the contour (Figure 10). The best assembly is secured by applying the top course of lining first, fillet welding the lower edge of the first sheet to the shell of the steel tank, then overlapping the second sheet an inch or so over the first, and proceeding in this manner to the bottom. If old tanks are to be lined, it is important to clean off all rust and scale, giving special attention to the areas where the lining material is to be welded.

The Welding Range

The utility of the welding arc for plant maintenance and low-cost alterations is never appreciated except where it is in operation. Extensions and alterations to low-pressure piping systems are extremely easy to make; and arc welding is the preferred method of joining high-pressure systems when there are qualified operators to do the work. Structural work such as platforms, railings, canopies, stairways, and gates can often be fabricated by welding with no more drawing room work than a rough sketch. There are innumerable repairs possible on worn or broken machinery parts, where the saving of shutdown time is far more important than the amount represented by replacement cost. In mills where corrosion conditions are severe, the economic value of the process is multiplied. For example, piping, special pipe fittings, or containers may be wanted either on short notice or at regular intervals (Figures 11, 12, and 13). Undoubtedly, these can be fabricated more economically in the well-equipped fabricating plant, but in an emergency, the time element may count for much more than either the fabricating cost or the small difference in the quality of the workmanship.

▶▶▶ A careful study of the several illustrations is recommended as an object lesson in the dependability of arc welded construction. These are mostly vital parts of mill equipment, and the welds in them carry every kind of working load. The welds are for the most part guaranteed, and many of them are insured. There is no reason at all why the welder in the mill should not match the quality of workmanship turned out by the specialty fabricator, for the latter has no monopoly on the quality method. He gets dependable results by maintaining perfectly simple and rational checks and controls over weld quality. He will weld anything weldable, but he will not start any one project without being sure of his procedure and equally sure of each operator who works on it. It is not to be expected that the mill welding department can compete to any appreciable extent with the fabricator, but certainly the department can safely broaden its usefulness, if it is willing to adopt the control measures which the production man considers to be so necessary.

EDITOR'S NOTE: The photographs used in illustrating this article were supplied through the courtesy of the following companies: Chicago Bridge & Iron Company (Figures 1, 2, 3, and 4), Wilson Welder & Metals Company (Figure 5), International Nickel Company (Figure 6), Youngstown Welding & Engineering Company (Figures 7, 8, 9, and 13), Alloy Fabricators, Inc. (Figure 11), and American Brass Company (Figure 12).

Pressure-Molded Fiber Products *from Cellulosic Materials*

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IN THE building industry, the general trend has been toward an increase in the cost of material. The present policy of encouraging low-cost housing favors any development which shows promise of substantial savings in the cost of building materials. In 1928, the Forest Service estimated that approximately two-thirds of the wood cut was lost in the forest and lumber mill and that a like proportion of the remainder was lost in the fabrication of furniture, houses, and similar products *(1)*. Thus, only 10 to 15 per cent of the tree enters the finished product. It was suggested by Herbert Hoover, then Secretary of Commerce, that if the wood were converted into pulp and molded into the finished product; the losses would be only those inherent in pulp manufacture, that is, 30 to 50 per cent *(1)*.

Experimental and commercial developments have indicated that good grades of cellulosic products, such as insulating board, pressed board, and paper, can be produced with reasonably high yields from fibrous agricultural by-products *(2)*. These materials are available annually in quantities greatly in excess of our cellulose consumption. Conservative estimates *(2)* place the annual production of corn stover at 150 million tons and that of wheat, oat, and rye straw at over 70 million tons for the United States alone.

The present study is concerned with the production of molded fibrous products from cellulosic materials. The composition and general properties of the products studied are similar to those of commercial pressed board. An almost unlimited variety of shapes, such as structural units, floor and roof tiles, barrels, furniture, and toys, could be molded; fiber sashes and fiber tubes were selected as representative examples for investigation. Basement window sashes, common building units used in large quantities, had the advantages for experimental purposes of being small and at the same time presenting representative molding problems. The production in a single piece of a product customarily fabricated from five members mortised together illustrates an advantage of molded products. The proper shaping of the groove for the glass without the necessity for any machine work introduced the important molding problem of compensating for unequal thickness.

The procedure for molding the fiber sash consisted of three steps: (a) the formation in a mold having exaggerated vertical dimensions; (b) cold pressing of the mat thus formed to approximately final dimensions; and (c) drying of several cold-pressed units simultaneously, under heat and pressure. These steps in the procedure were necessary because, while the material in dilute suspension is hydraulic in behavior, it becomes non-hydraulic as pressure is applied and the effective vertical dimensions decrease. This change in character of the pulp necessitated a mold designed for proportional distribution of fiber during the suspension and compression stages to compensate for unequal thicknesses and to secure equal density in all parts of the product.

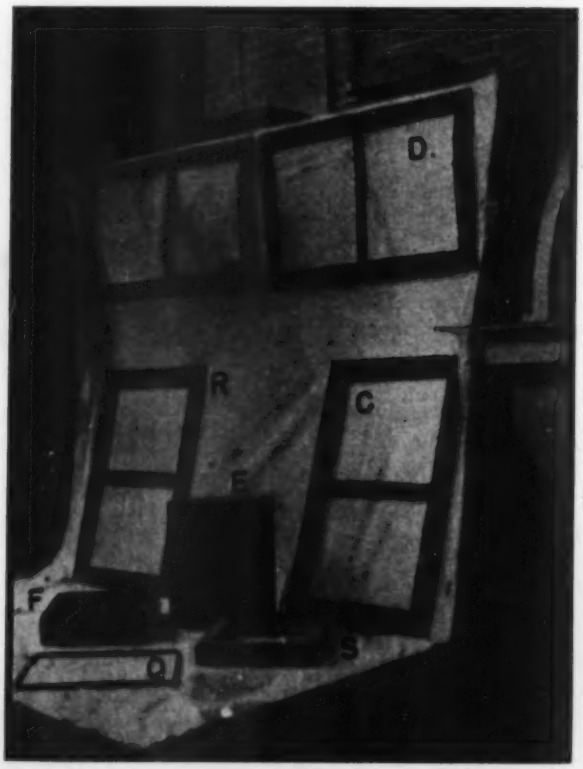


Fig 1.—Parts of fiber sash mold.

EXPERIMENTAL PROCEDURE FOR MOLDED FIBER SASH

Formation

The ordinary two-pane basement window sash was selected for molding. The cornstalk pulps used were made according to the usual procedures for pressed board from agricultural wastes (6), while news and sulphite pulp in various proportions were merely slushed in the beater. The equivalent of three pounds of oven-dry fiber, made up to three per cent consistency, was used for each sash. Flaked paraffin was added to the slushed pulp prior to forming. It was found that 0.45 pound of paraffin was sufficient to effectively waterproof each sash.

The molding procedure and the apparatus are illustrated in Figures 1 to 6 inclusive. The same letters are used to designate a given part of the apparatus in all of the figures.

The bottom die consisted of several parts. A heavy

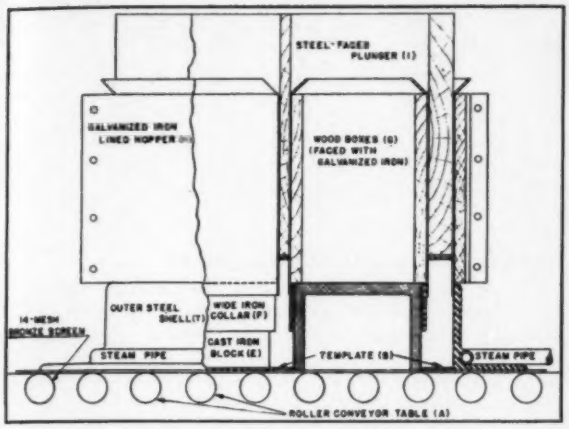


Fig. 2—Details of fiber sash mold.

14-mesh bronze screen was placed on a roller-type conveyor table, *A* (Figure 2), attached to a hydraulic press. On this screen was placed a perforated steel template, *B* (the upper surface being screen-faced) having the same shape as the face of the fiber sash, for spacing the two hollow cast iron blocks, designated by the letter *E* (Figure 1). These blocks shape the openings in the fiber sash. Two wide iron collars, *F* (Figure 1), supported by removable pins, were placed in a position around and flush with the tops of the blocks, *E*. The thickness of these collars was equal to the desired width of the glass groove, and the height was equal to about half the depth of the cast iron blocks. (These collars served the purpose of obtaining the proper proportioning

Fig. 3—Interior of fiber sash mold.

Fig. 4—Exterior of fiber sash mold.

of the fibers in the hydraulic stage to secure uniform density in the subsequent cold pressing. During the cold-pressing stage, the supporting pins were removed, and the collars were actuated by cleats on the plunger so that they moved downward as a unit, the collars extending far enough below the plunger to obtain the proper depth of the groove.) Two galvanized iron-faced wooden boxes, *G* (Figure 2), were used to increase the effective height of the cast iron blocks, in order to obtain sufficient capacity for the 3 per cent pulp

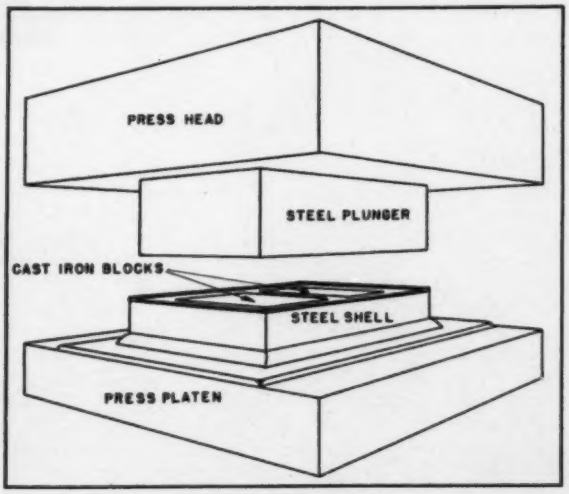


Fig. 5—Diagram of steel mold for fiber sash.

Fig. 6—Steel mold for fiber sash.

suspension. A steam-heated steel shell, *T* (Figure 2), was then placed in position around the steel template. The effective height of this shell was increased by a wood hopper, *H*, lined with galvanized iron.

The top die, a steel-faced deep plunger, *I* (Figure 2), having the same cross section as the face of the sash, was used to force the fiber suspension into the mold. This plunger was forced into the bottom die by a jack, *M*, acting on the truss work shown at *J* and *K*.

Cold pressing

For cold pressing, the entire superstructure was removed from above the steel mold, the pins withdrawn from the wide iron collars, and the mold rolled onto the lower platen of the hydraulic press where it was centered under the steel plunger (Figure 5). (The plunger was cored for steam and bolted to the head of the press.) The sash in the mold was raised against the plunger with a pressure equivalent to 65 pounds per square inch. Simultaneously, cleats on the plunger engaged the collars, holding them in a position the desired distance below the plunger, thus forming the groove for the glass. This resulted in a sash of uniform density. When the flow of water had ceased, the pressure was released, the press opened, and the mold rolled out onto the table.

A second and third sash were formed on top of the first. Narrow collars, *Q* (Figure 1), were inserted in the grooves of the lower sashes in order to prevent them from being crushed out of shape during subsequent pressing. A template was placed on top of each sash to provide a flat surface for the bottom of each succeeding sash. The three sashes filled the six-inch mold.

Drying

After the cold pressing of the third sash, flexible steam couplings were attached to the plunger and shell of the mold, and steam was admitted to the steam spaces. The drying was accomplished in about three hours under a pressure of 65 pounds per square inch and at a temperature of about 297 deg. Fahr., corresponding to a steam pressure of 50 pounds per square inch. During this operation the wax, distributed within the pulp, melted and saturated the fibers. The drying time varied with the type of pulp employed. For a commercial installation, a very tall mold with heated cores and shell could be used for drying a large number of sashes simultaneously. With the small area characteristic of sashes, low total pressure conditions are involved, and a simple two-platen, wide-opening mechanical or hydraulic press could be used. (For pressed board a resistance method for determining moisture *(5)* proved a convenient and dependable criterion and can be used for controlling the drying of fiber sash. When the sashes were dry, the mold was fastened to the head of the press and the platen was dropped away from the mold to permit the insertion of wood blocks under the shell and cast iron blocks. The shell and iron blocks were forced up past the bottom of the plunger, extruding the sashes and template by this action.

Conditioning the fiber sashes

On standing for a time, the first few experimental sashes warped even though varnished or painted. This was probably due to unequal moisture distribution. This warping was difficult to correct by any subsequent treatment. To avoid this condition, dried unvarnished sashes were steamed and stored for several days in the hot, moist air of the heating tunnel of the Chemical Engineering Building at Iowa State College until uniform moisture distribution was attained. Paint and varnish were successfully applied to conditioned sashes. Conditioned sashes, both painted and unpainted, showed only occasional instances of slight warping.

Physical tests on the fiber sashes

Practical physical tests were developed. The sections shown in Figure 7 were tested for compression and tension on a standard apparatus such as used for steel. Rollers were used for tests *B* and *D* to eliminate the effects of friction between the specimens and the support. These tests and results are given in *A*, *B*, *C*, and *D* in Figure 7 and Table I; the data have been calculated to values in compression and in tension per unit area along the line of break. The values for modulus of rupture were determined in a transverse breaking tester and calculated by the standard formula *(4)*.

Comparisons of the results secured on tests of sashes made from 100 per cent newsprint show that sashes containing

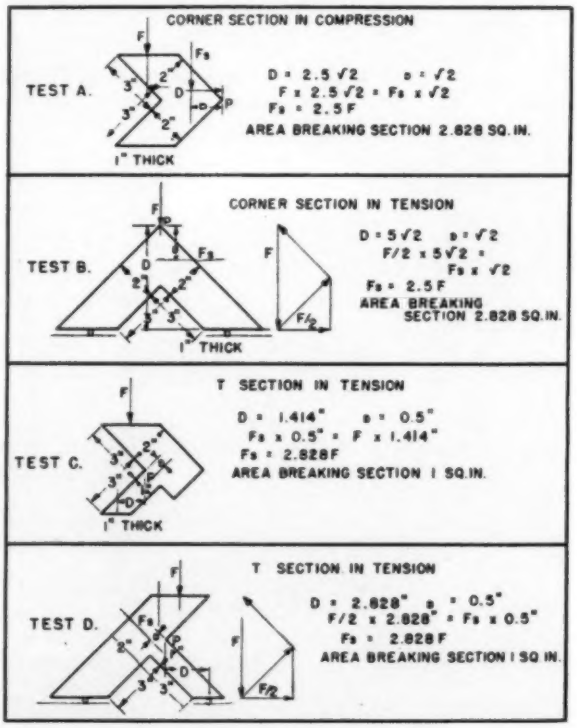

CORNER SECTION IN COMPRESSION
TEST A.
D = 2.5 √2 s = √2
F x 2.5 √2 = Fs x √2
Fs = 2.5 F
AREA BREAKING SECTION 2.828 SQ. IN.
1" THICK
CORNER SECTION IN TENSION
TEST B.
D = 5√2 s = √2
F/2 x 5√2 = Fs x √2
Fs = 2.5 F
AREA BREAKING SECTION 2.828 SQ. IN.
1" THICK
T SECTION IN TENSION
TEST C.
D = 1.414" s = 0.5"
Fs x 0.5" = F x 1.414"
Fs = 2.828F
AREA BREAKING SECTION 1 SQ. IN.
1" THICK
T SECTION IN TENSION
TEST D.
D = 2.828" s = 0.5"
F/2 x 2.828" = Fs x 0.5"
Fs = 2.828 F
AREA BREAKING SECTION 1 SQ. IN.

Fig. 7—Details of tests of fiber sash.

Table I—Results of Strength Tests

Type of pulp (a)	Type of test (b)	Force applied, pounds	Resultant force, pounds	Area, sq. in.	Breaking strength, lb./sq. in.
100 % news	A	2,330	5,825	2.828	2,060
No paraffin	A	2,190	5,475	2.828	1,935
	B	1,350	3,375	2.828	1,193
	B	1,060	2,650	2.828	935
	C	720	2,040	1.000	2,040
	D	370	1,047	1.000	1,047
100% news	A	1,620	4,050	2.828	1,430
	A	1,530	3,825	2.828	1,350
	B	470	1,175	2.828	415
	B	960	2,400	2.828	838
	C	600	1,700	1.000	1,700
	D	250	708	1.000	708
75% news	A	1,080	2,700	2.828	955
25% sulphite	A	1,270	3,175	2.828	1,122
	B	1,470	3,675	2.828	1,290
	B	580	1,450	2.828	511
	C	450	1,273	1.000	1,273
	D	530	1,500	1.000	1,500
50% news	A	1,430	3,575	2.828	1,265
50% sulphite	A	1,570	3,925	2.828	1,390
	B	420	1,050	2.828	371
	B	1,120	2,800	2.828	990
	C	430	1,217	1.000	1,217
	D	760	2,150	1.000	2,150
25% news	A	820	2,050	2.828	725
75% sulphite	A	1,200	3,000	2.828	1,060
	B	770	1,925	2.828	680
	B	710	1,775	2.828	627
	C	350	990	1.000	990
	D	265	750	1.000	750
100% sulphite	A	620	1,550	2.828	548
	A	1,590	3,975	2.828	1,405
	B	720	1,800	2.828	636
	B	720	1,800	2.828	636
	C	300	850	1.000	850
	D	140	396	1.000	396
Steeped	A	1,120	2,800	2.828	1,255
cornstalks	A	800	2,000	2.828	706
	B	900	2,250	2.828	795
	B	1,080	2,700	2.828	1,210
	C	590	1,670	1.000	1,670
	D	290	821	1.000	821

(a) 15% paraffin added to all pulps except as noted.
(b) For type of test see Fig. 7.

no paraffin are stronger than those with paraffin. This is to be expected since integral sizing tends to weaken a product of this type. A comparison of the sashes made from various mixtures of newsprint and sulphite pulp shows, in the case of the modulus of rupture and of the tension test *C*, from sashes from 100-per cent newsprint are the strongest, tending to become weaker as the proportion of the sulphite pulp increased from 0 to 100 per cent. The other tests, while not showing such a regular relation between pulp mixtures and strength, show the same general trend. For example, in all tests the 100-per cent sulphite pulp sash was either the weakest or next to the weakest, and the 75-per cent sulphite was weaker than the 25-per cent sulphite pulp sash. The test values on the cornstalk pulp sash, although in all cases higher than those on the sulphite pulp sashes, were rather erratic.

In considering the test data, these facts should be kept in mind: (a) the results are essentially preliminary in nature because of the limited number of tests; and (b) the cornstalk pulp was a comparatively crude material made by a low-cost process. The sashes made from any of the pulps were strong enough to meet practical needs.

The data on individual corner- and T-sections indicate very good strength. It is evident that four or more of such sections in a unit show a mutual reinforcing action, which, combined with good moduli in the straight sections, results in a strong rigid structure. This confirms the practical observation that sashes from any of these materials are strong and sturdy and would be practical in actual service.

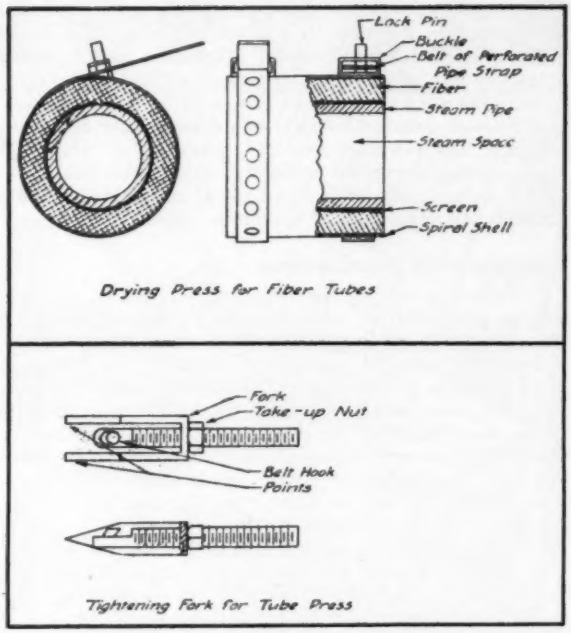


Fig. 8—Details of fiber tube apparatus.

Tests are being made to determine the resistance of the sash to weathering under natural conditions of use. Additional strength tests are also being carried out.

EXPERIMENTAL PROCEDURE FOR FIBER TUBES

Fiber tubing is a common practical unit and presents its own peculiar molding problems. The experimental mold for pressing and drying the tubes is shown in Figure 8. It consisted of a steam-heated pipe core surrounded by a screen to aid the escape of moisture from the fiber. The wet mat of fiber tube was formed around this screen and covered with a wrapping of perforated metal with one edge overlapping the other. Belts of perforated metal strap were placed at short intervals along the length of the mold to produce the necessary pressure for molding and drying. The pressure was continuously maintained by means of a special fork whose prongs were inserted in the buckle of the strap. The seamless tubes produced were similar to pressed board in structure and density, and dried at a rate corresponding to a similar thickness of pressed board. No physical tests were applied to the tubes but various practical

Table 2—Moduli of Rupture of Various Sash Cross Sections

Composition	Modulus, pounds per square inch*
100% Newsprint No size	4560
100% Newsprint Paraffin size	4421
75% Newsprint 25% Sulphite	3404
50% Newsprint 50% Sulphite	3234
25% Newsprint 75% Sulphite	2981
100% Sulphite	2213
Cornstalk pulp	2400

*Modulus of rupture (lbs. per sq. in.) $= \frac{3pl}{2bd^2}$ where p = load in lbs., l = distance between supports (in inches), b = breadth of board (in inches), and d = thickness of board (in inches).

observations were made. The tubing was light, rigid, and homogenous in structure. It was water-resistant, and it had a smooth hard outer surface. It offered the same economy in use of fiber afforded by the general method of molding.

The production of molded tubes could be carried out efficiently on a commercial scale by replacing the tightening fork and straps with chains and sprockets, or cables and small winding drums on a common shaft. This equipment would maintain the pressure necessary on the tube during the concentric shrinking of the fibrous mass.

Commercial production

Fromm *(3)* outlined the following process for the commercial production of window sashes: Shredded stalks are made into pulp by digesting in water under steam pressure and refining in a rod mill and a "fibrator;" the fiber pulp is mixed with grated paraffin, distributed to the hydraulic forming presses and cold-pressed; the molds containing the sashes are removed to the steam-heated hydraulic presses in which the final pressing operation is carried out; the sashes are then conditioned to a uniform moisture content and smoothed, by sanding, to prepare them for market. To estimate the cost of production, Fromm assumed, as a basis, a factory manufacturing 10,000 sashes per 24 hours. Such a plant would require an investment of about $500,000 *(3)* and would produce the ordinary cellar window sash for about $0.13 each.

Summary and Conclusions

Strong, practical cellar window sashes and fiber tubes have been produced experimentally from waste newsprint, and cornstalk and sulphite pulps.

The sashes were waterproofed satisfactorily with paraffin.

Warping was avoided by proper conditioning.

The sashes were painted and varnished successfully.

The cost of these fiber sashes would be less than the cost of the conventional wood sashes.

Further tests in serviceability and practicability are being carried out.

Acknowledgments

The work described was a part of the research studies on agricultural by-product utilization carried out at Ames, Iowa, by the Iowa Engineering Experiment Station, Iowa State College, largely by or under the direction of E. R. Whittemore.

Literature Cited

1)—Acree, S. F. National Bureau of Standards, Washington, D. C. (Oral Communication, based on Forest Service Reports).

2)—Arnold, L. K. Utilization of Agricultural Wastes and Surpluses. Bulletin 113, Engineering Extension Service, Iowa State College. 1933. See also: National Bureau of Standards Misc. Pub. 112 and Iowa Engineering Experiment Station Bulletin 98.

3)—Fromm, H. Gordon. The Design of a Plant for the Production of Pressed and Molded Window Sash. Unpublished B.S. Thesis, Iowa State College. 1933.

4)—Sweeney, O. R., Hartford, C. E., Jr., Richardson, R. W., and Whittemore, E. R. Experimental Studies on the production of Insulating Board from Cornstalks. Iowa Engineering Experiment Station, Bulletin 102. 1931.

5)—Whittemore, E. R., Overman, C. B., and Wingfield, Baker. Semi-Commercial Drying of Pressboard by Measuring its Electrical Resistance. *Ind. Eng. Chem.* 27:231. 1935.

6)—Wingfield, B., Naffziger, T. R., Whittemore, E. R., Overman, C. B., Sweeney, O. R., and Acree, S. F. Production of Pressboard from Cornstalks. National Bureau of Standards, Misc. Pub. M-123. 1936.

STORY OF A MAN WHO SOLD HOT DOGS

There was a man who lived by the side of the road and he sold hot dogs.

He was hard of hearing so he had no radio.

He had trouble with his eyes so he read no newspapers.

But he sold good hot dogs. He put signs up on the highway, telling how good they were.

He stood on the side of the road and cried, "Buy a hot dog, Mister?" and people bought.

He increased his meat and bun orders.

He bought a bigger stove to take care of his trade. He finally got his son home from college to help him.

But then something happened. His son said, "Father, haven't you been listening to the radio? Haven't you been reading the newspapers? There's a big depression on. The European situation is terrible. The domestic situation is worse. Everything's going to pot."

Whereupon the father thought, "Well, my son's been to college, he reads the papers and he listens to the radio, and he ought to know." So the father cut down on his meat and bun orders, took down his advertising signs, and no longer bothered to stand out on the highway to sell his hot dogs. And his hot dog sales fell almost overnight.

"You're right, son," the father said to the boy. "We certainly are in the middle of a great depression."

(Reprinted from July 1, 1939, issue of *The American Lumberman*.)

Typical stand of timber on Southern paper mill company's reforestation land.

PAPER SKETCHES

IN THE EARLY 1830'S DANIEL STEBBINS OF NORTHAMPTON, MASS. IMPORTED MULBERRY TREE SEEDS FROM CHINA, PLANTED THEM, AND FROM THE RESULTANT TREES, MADE SEVERAL REAMS OF FINE QUALITY WRITING PAPER.
AS LATE AS 1920, A SOUTH TYROLEAN PAPER MILL WAS STILL UTILIZING THE OLD STYLE STAMPERS.
WHEN THE CHILDREN OF HOLLAND GULP FOOD, THEIR PARENTS EXCLAIM: "YOU MUST HAVE BEEN RAISED BY THE PAPERMAKERS!"
THE DUTCH PAPERMAKERS OF OLD WERE NOTORIOUSLY NIGGARDLY IN FEEDING THEIR HIRED HELP; THEY SERVED FOOD PIPING HOT, THEN, BEFORE THE "HANDS" COULD FINISH IT, PROCLAIMED DINNER TIME OVER, AND SENT THE MEN BACK TO WORK.
SHEETS OF KRAFT PAPER ARE USED IN THE DRY ICE PLANT OF THE PENNSYLVANIA SUGAR COMPANY TO PREVENT STICKING OF EACH CHARGE OF CO_2 SNOW AND ITS RESULTANT SOLID BLOCK OF DRY ICE TO THE STEEL BOTTOM PLATE OF EACH ICE PRESS. A SHEET OF PAPER IS PLACED ON THE BOTTOM PLATE OF EACH PRESS PRIOR TO CLOSING AND CHARGING. THUS THE CO_2 SNOW, WHICH IS PRESSED DOWN INTO A SOLID BLOCK, ACCUMULATES ON THE PAPER RATHER THAN THE BOTTOM PLATE OF THE PRESS.

Technical Talks and Tours Thrill TAPPI

▸▸▸ FINE WEATHER—GRAND HOSPITALITY—a first class program! That, and everything else desirable, was a part of the picture when a record crowd of members and guests of the Technical Association of the Pulp and Paper Industry gathered in Syracuse, New York, from all parts of the nation and from many parts of Canada, to attend the organization's annual fall convention. The conclave went into the record as one of the largest in the history of TAPPI and was sponsored by the Empire State Section, most-recently chartered unit of the national association's many regional groups.

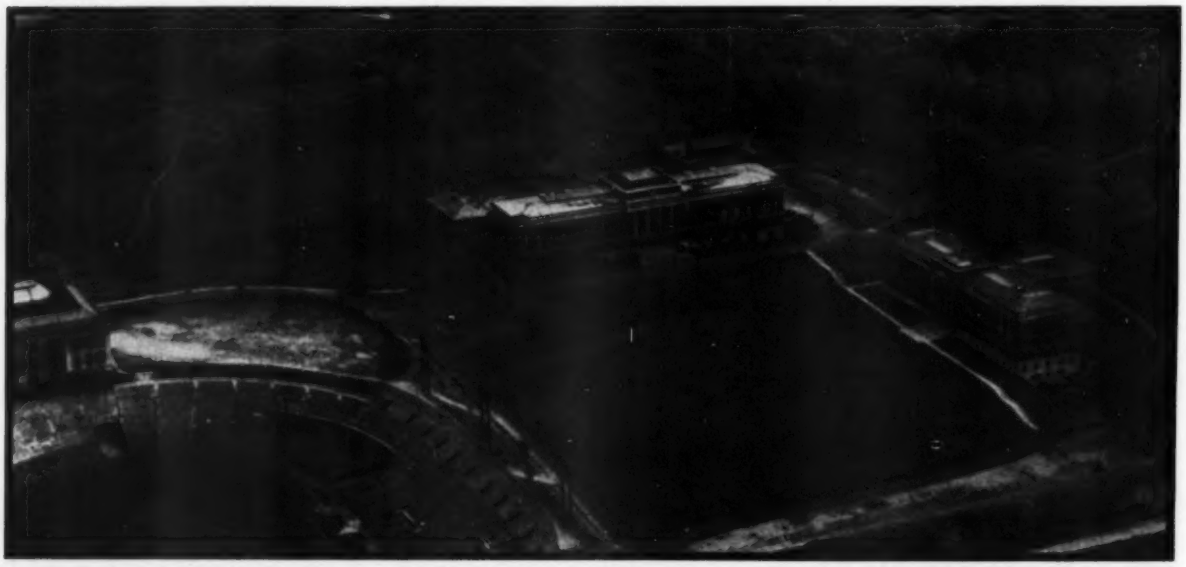
The program extended from September 12-14, just in time to catch the turn of the season in beautiful northern New York, with lakes a sparkling blue and the surrounding hills in changing foliage. Explanation for the large turnout was said to be the ideal geographical location of Syracuse in relation to pulp and paper mills.

The convention headquarters, Hotel Syracuse, provided an ideal spot for this big, convivial, "old home week" of pulp and paper technicians. The lobby floor plan was such that TAPPI exhibits, registration desks, and other features were centered to striking display without crowding the main floor. The entire tenth and eleventh floors, with private rooms, banquet halls, and space for executive meetings, were also given over to TAPPI. Hotel officials commented that out of more than 1,000 major conventions held at Syracuse, the TAPPI delegates and their guests were far to the front in terms of graciousness, tone, ease of accommodations, and co-operative response to the management.

The agendum was geared to fast tempo and went marching ahead right on time. A well-rounded technical program was so well balanced with recreational features that delegates never found an idle moment. Despite the fact that emergency conditions of the European war had forced last-minute cancellations in certain exhibit equipment and, also, reduced representation somewhat, the displays were broad-ranged, interesting, and up-to-the-minute. Activities got off to a good start and kept pace until the last goodbye was said. Morning sessions for the menfolk were held strictly to a technical nature with an outlay of speakers representing some of the finest world experts in the entire field. Chairman for this section of the program was Professor C. E. Libby, head of the pulp and paper division of the New York State College of Forestry at Syracuse.

While husbands were busy at technical sessions or stag luncheons, there was a grand outlay of recreational doings to keep the ladies happy. Mrs. H. M. Day of the Syracuse Chamber of Commerce, was a prime good hostess and general helper outer for a series of luncheons, golf touranments, and bridge parties. A highlight of this program included luncheon at the world famous Krebs eating place at Skaneateles. The ladies also took a tour through the beautiful Finger lakes area.

If any particular "drift" of the broad-scoped technical program could be marked, it was seen perhaps in a general leaning toward the utilization of forest products in pulp and paper manufacture. Such a theme tied in most advantageously with a great amount of practical application that was subsequently reviewed in group visits at the pulp and paper mill and laboratory of the New York State College of Forestry. This very interesting "factory on a campus" has been accredited by authorities as the most completely equipped set-up of its kind either here or abroad. As a matter



Air view of New York State College of Forestry. Front view of Bray Hall, and a side view of Louis Marshall memorial building (at right). The new pulp and paper laboratory is to the rear of Bray Hall and is not visible in this picture.

of incidental comment, however, fellow committee members of the Empire State Section have quietly agreed among themselves that the genial, hard-driving Professor Libby has probably given as much of himself in the preparation and follow-through of this convention as any man on the "work-horse" list.

The stag luncheons, both Tuesday and Wednesday, were stimulating both to physical and mental appetities. Tuesday's affair included greetings from national officers and members of the Empire State Section. Included in the former group was an interesting address by F. C. Clark, president of TAPPI, who stressed in his talk that there is much to be learned in papermaking. Mr. Clark paid tribute to the progress made by technicians in solving papermaking problems and also to Professor Libby and the College of Forestry, but pointed out that many problems have yet to be solved within the industry.

▶▶▶ Two other interesting speakers on this Tuesday luncheon program were George W. Sisson, Jr., president of the Racquette River Paper Company at Potsdam, New York, and Dean Samuel N. Spring of the New York State College of Forestry.

Mr. Sisson, a dean in his own right among New York papermakers, produced a manuscript which had come down through his own family, telling about the processing of some of the earliest paper ever made in the Northeast. The description itself was a far cry from the scientific manner in which paper is made today. Mr. Sisson made use of this old document to stress the point that research had gone far indeed to blaze the trail for better manufacture. He made it clear, however, that there is a long way still to go before the possibilities of the field are exhausted. This still undetermined margin, he said, present a real challenge to research and manufacture alike. Mr. Sisson's keen attack and witty observations made his share in the program a real standout. Following Mr. Sisson, Dean Spring spoke on "What the New York State College of Forestry is Doing Today." The dean was in his usual good form, and his gentle interspersions of rare humor won a fine response from his audience. He gave a fine presentation of the growth and development of the New York institution, pointing out how at various times its graduates had stepped out to meet a variety of timely demand. With a more recent trend of specialized demand, the dean pointed out, the college is now trying to keep in even more exacting step in order to supply

Dr. Hugh P. Baker, president of Massachusetts State College, delivered the principal address at the TAPPI convention. He spoke on what the industry may expect from Government and what it must do to keep its own house in order.

men to meet the manufacturer's needs. It results in an entirely new venture in terms of adaptability tests for students, he stated. The aid of the manufacturers, technicians, and executives would soon be directly solicited in an effort to make this new man-power test as mutually beneficial as possible.

Mal Hallet and his orchestra took over for Tuesday night's informal banquet, which included a fast-stepping floor show. A local pinch-hitter substituted in the role of master of ceremonies for Francis C. Bowman, advertising manager of the Carborundum Company of America, who at the last minute was unable to come. With the exception of this one disappointing feature, the party was a "rip-roaring" success.

The guest of honor and speaker for Wednesday's noon stag luncheon was Frank W. Lovejoy, sales executive for the Socony-Vacuum Oil Company, Inc., of New York City. Mr. Lovejoy provided fine entertainment in his general theme that the pulp and paper industry has not fully tapped its own resources in any accepted policy to date that covers progressive merchandising—pronounced by Mr. Lovejoy as "Merchant-I-Sing." He pointed out that the ordinary buyer is much more interested in what "he wants" than what "you've got." The problem, therefore, is to fit the buyer's pattern, neatly packaged and aimed in advertising to fit the needs of the common person.

▶▶▶ Formal sessions of the convention were put aside on Wednesday afternoon as the delegates started on tours of inspection to various indus-

Left—R. G. Macdonald, national secretary of TAPPI (left), and Homer M. Rice, chairman of the Empire State Section's registration committee, talk over the situation. Right—In conference at the convention. L to R: F. B. Tompkins, editor and publisher of the annual program; W. J. O'Brien, chairman of the printing and publicity committee; Homer M. Rice, chairman of the registration committee.

trial plants of central New York. Busses were provided to take the delegates on the tours they selected. A great many visited the pulp and paper laboratory at the New York State College of Forestry, while others went to the Crucible Steel Corporation of America's plant, the Goulds Pump, Inc., plant at Seneca Falls, Morris Machine Works at Baldwinsville, the Dilts Machine Works at Fulton, or the Carrier Corporation plant at Syracuse.

About seventy-five members of TAPPI were guests of the Carrier Corporation on Wednesday afternoon. The group assembled at the company's auditorium at 3 p.m., at which time E. T. Murphy, vice president, and J. I. Lyle, president of the air conditioning firm, welcomed the gathering. L. G. Powers, Cleveland district manager for Carrier, briefly outlined the need for, and advantages of, air conditioning in paper manufacturing. Carl Ostling, director of plant production, then assigned groups of four guests to each Carrier guide for a 1½-hour tour of the 31-acre plant where they witnessed various steps of production of Carrier equipment.

▶▶▶ One of the highlights of the three-day session was the joint formal dinner and dance which took place on Wednesday evening in the grand ballroom of the Hotel Syracuse. The speaker for the evening was Dr. Hugh P. Baker, former dean of the New York State College of Forestry and one-time executive secretary of the American Paper and Pulp Association. Dr. Baker is a well-known figure in pulp and paper circles. Now president of the Massachusetts State College at Amherst, he was dean of the New York forestry school from 1912 to 1920 and from 1930 to 1933, two important periods in the school's growth period. Dr. Baker recognized the need of a specialized department for pulp and paper training and his interest and endeavor were responsible for the rapid growth of the department, not only in the number of students in this field, but in the erection of a modern laboratory building in which pulp and paper work is now concentrated. Prior to his connection with the New York institution, Dr. Baker was manager of the Trade Association Department of the United States Department of Commerce.

In his speech on Wednesday evening, Dr. Baker told his listeners what the pulp and paper industry is facing today and what it must do to preserve its profitable degree. The topic of Dr. Baker's address was "Maintaining Ethical Standards in Business as Applied to the Pulp and Paper Industry." He outlined governmental buffeting that the entire industry faces today, and how hard it is to show a decent profit. He declared that in his own opinion, at least 97 per cent of today's business men really want to be honest and if they veer from it the case is merely too much red tape and lack of understanding in a fast-changing pattern of rules.

"There is no business or governmental policy which justifies the continuation of business in this country at a loss," Dr. Baker stated. "Apparently, business men have not always agreed to this particular policy because at times, through the reluctant acceptance by business men of certain forms of unfair competition, such as ruthless price control and price cutting, business has operated at a loss when, fundamentally, there has been no justification of such operation."

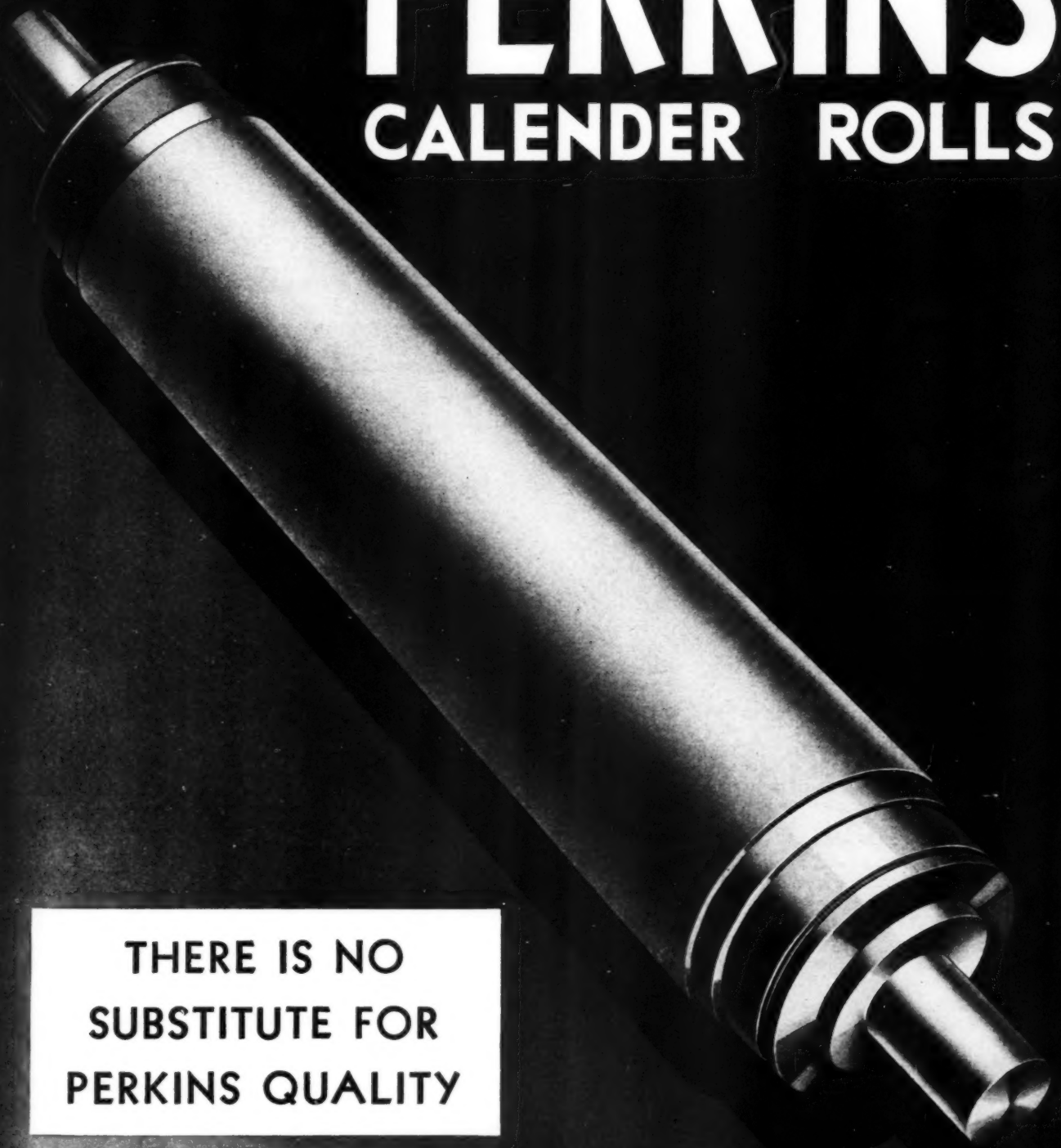
Dr. Baker pointed with pride to the fact that American business men can grade their own collective boot-straps in an effort to hold a firm, united front; this as against other parts of the world where that same opportunity has long since gone by the boards. He advised his listeners that the first place and the best place for an industry to take hold of house-cleaning is from within. He further stressed that there is still time and opportunity to do it; that the onus simply results in a fair-play policy throughout the industry to which all agencies must strictly adhere.

During the dinner, the chorus of the Syracuse Post, American Legion, entertained with vocal selections, Mal Hallet's orchestra played selections during dinner and provided music for dancing afterwards.

The actual business of the convention was wound up Thursday morning so that TAPPI members could avail themselves of the opportunity of taking part in the recreational program arranged for the afternoon and evening.

▶▶▶ Following the regular morning session on Thursday, delegates were at liberty to choose their afternoon's diversion. Many had brought along their golf clubs and hastened off to the Syracuse Yacht and Country Club on the shores of Oneida Lake where the Eastern Amateur Championships were held recently. The golf tourna-

PERKINS
CALENDER ROLLS



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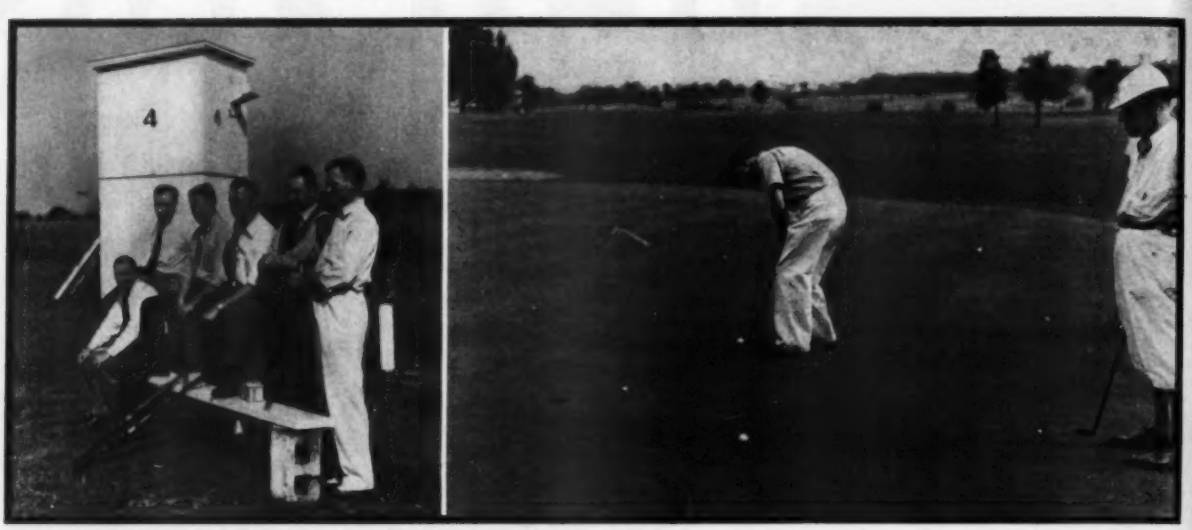


Left—These "skeeters" shot it out at the Onondaga Trap and Skeet Club. (L to R): J. D. Haskell, K. E. Youngchild (seated), Fred C. Goodwill, S. E. Mower, Vernon Woodside, and G. E. Osterhelt, mayor of Cranston, N. J. Mr. Youngchild won the match, with Mr. Haskell second. Right—Over the final hurdle to the 19th hole, an "international" angle at the Solvay Sales Company's clambake. R. M. Drummond, of the International Paper Company, is putting, while J. N. Stephenson, editor of "Pulp and Paper Magazine of Canada" awaits his turn.

ment resulted in the following scores:

First low net, Harry D. Frost of the Sinclair Company, Holyoke, Massachusetts; second low net, R. R. Stoltz of the Pittsburgh division of Westinghouse; first low gross, J. K. Donahue of the Imperial Paper and Color Corporation, Glens Falls, New York; second low gross, J. Edwards of Price Brothers & Company, Kenogami, Quebec; blind bogey, R. L. Carr of the Mathieson Alkali Works, Inc., Niagara Falls; drive nearest 14th hole, Jerry Strasser of the Stein-Hall Company, Chicago; high gross, R. Aston of the Mathieson Alkali Works, Inc., Niagara Falls who tied with Milton H. Maguire of the Hercules Powder Company's Holyoke division; most sevens, C. G. Dandro of the Johns-Manville Company, who tied with J. W. Hemphill of the same concern; fewest putts, W. W. Macklin of the Black-Clawson Company, Hamilton, Ohio.

Many other TAPPI members and guests were taken by bus to the Onondaga Skeet Club near Dewitt where they tried their luck on the skeet range. At the end of the afternoon, all gathered at the Syracuse Yacht and Country Club for the closing event on TAPPI's fall meeting program . . . an old fashioned clambake, with all the trimmings, which was sponsored by the Solvay Sales Company.

◆

SIDELIGHTS

▶▶▶ A beautiful display on the main convention floor of the hotel, coupled with some outstanding state promotional literature, offered an inviting reminder that the next fall convention will be held at Seattle, Washington.

▶▶▶ Dean of equipment exhibitors, and right in top form, was Professor Frank M. Williams, 68 year old senior partner of the Williams Apparatus Company of Watertown, New York. He officially "closed up shop" for the wee small hours that followed the dancing and general merriment of Tuesday and Wednesday evening. Professor Williams gave up teaching at Clarkson Tech because, as he said, teachers' conventions are dull affairs as compared with those of the paper industry.

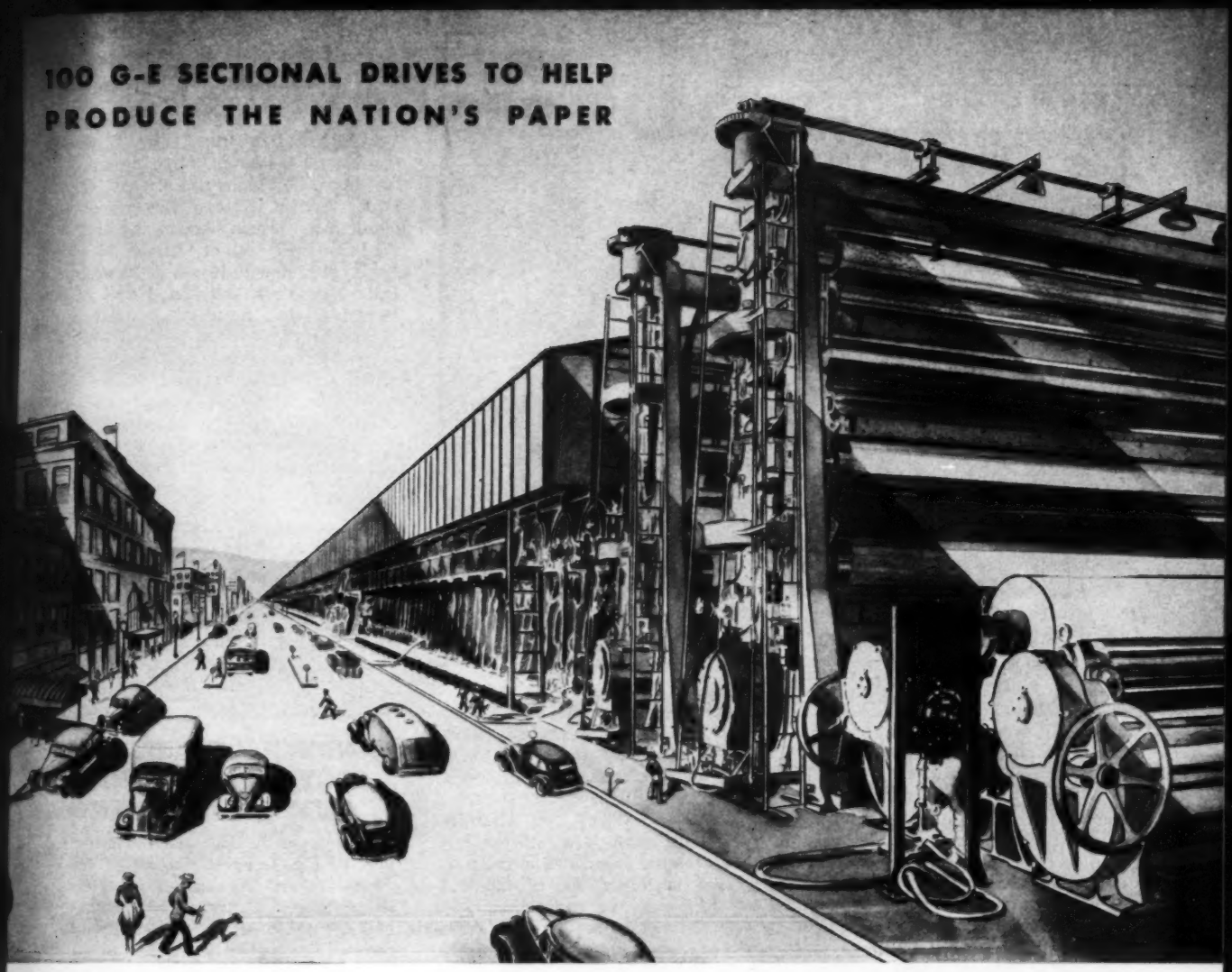
Professor Williams, pointed out by many outstanding delegates as a person in excellent authority to speak, said that he has no particular fear that wartime curtailment of foreign equipment shipments will in any way hinder the forward march of pulp and paper for the war's duration. The American field of supplies is well geared to hold its own very nicely, he said. He concurred with others that both American research and progress, during recent years, have completely outdistanced certain foreign countries which formerly were accredited as leaders of the industry. He stated, however that many years will pass before the entire potentialities of paper will have been thoroughly covered:

▶▶▶ Stress that the United States really is a democratic nation came to the front, momentarily, when an observer caught a pair of honest-to-goodness Americans talking things over. One was Mr. Uong, American-born executive of the Fitchburg Paper Company, whose forebears came over from China. The other was Bill Okumoto, photographer for the Syracuse Post-Standard, with a similarly remote reach-back to Japan. Any respective sympathies they may have had in the current Oriental fracas were thoroughly effaced by their common enthusiasm for a trick lens in one of the microscopes on display.

▶▶▶ Executives of the Onondaga Printing Company, printers of the TAPPI program and yearbook, revealed that this book is the largest convention program that they have seen for a Syracuse conclave during their 60 years of experience. The book was compiled by F. B. Tompkins and Associates, of Syracuse, an advertising counsel and public relations agency which materially shared in many of the preliminary details of this big convention. Mr. Tompkins himself said that Professor Libby had taken such a tremendous responsibility in double-checking the scientific data of this book that the professor now merits an honorary membership in the firm itself. Professor Libby retorted that he'd rather go fishing down in Maine, where he was born.

▶▶▶ Radio played its share in making northern New Yorkers aware of the convention. Over WFBL, on Tuesday, R. F. Huntley, chairman of the entertainment committee, and Homer M. Rice, registrations head, made their debut. The listening public missed the best of it by not seeing Homer's gesticulations in front of the microphone. The noise they heard that sounded like a ton of brick was Huntley, pounding home his facts by slamming his notebook on the interview table. They did a nice job of telling about the Empire State Section.

On Wednesday, Fred C. Clark, na-



IMAGINE A PAPER MACHINE 6 MILES LONG!

That would be the size of the composite paper machine driven by the 100 G-E sectional drives built in this country

LONGER than Main Street in a small town, longer than the main thoroughfare in most cities, and high as a skyscraper—that would be the size of one paper machine that totals in bulk the size of *all* 100 paper machines driven and controlled by General Electric sectional drive.

In 1909 one venturesome mill accepted the first sectional drive. In 1939 the order has been received for the 100th system of this type of drive.

Sectional drive is the most generally effective, efficient, and simple-to-operate system. Individual cases differ, and various special adaptations are made. But in the main, from an engineering and operating standpoint, the G-E sectional drive has the greatest advantages for high-speed paper making.

Is this the only type of paper-machine drive which General Electric furnishes? Not by a vatful! In many mills you will find General Electric single-motor drives and adjustable-speed turbine drives.

For questions on this drive or any other electric equipment, ask the G-E office near you, or write General Electric, Schenectady, N. Y.

A Message from Mr. J. KINDLEBERGER

Chairman of the Board,
Kalamazoo Vegetable Parchment Co.

"Why certainly, we have two General Electric sectional drives. With fast-running paper machines, they have become a necessity — thanks to the ingenuity of G-E engineers!"

"Uncle Jake"

GENERAL ELECTRIC

011-400

This group of delegates posed during the visit to the Carrier Corporation plant. Walter Rowe, that company's advertising manager is in the center of the group—the others hurried away without giving their names to the photographer.

tional president of TAPPI, made his own debut over the same station. He told of his own experiences in the way that a paper technician can aid in the detection of fraud, counterfeit, and crime. Jim Deline, veteran radio interviewer, recalled that Mr. Clark had been in position to offer expert testimony about the authenticity of certain documents in the $40,000,000 Black Tom explosion case. Aside from a brief admission that his technical attack had proved one vitally important document to be a phony, Mr. Clark adroitly steered away from the subject by informing Mr. Deline that the case is still open. He preferred to get down to the basis of a mere $10,000,000 case, wherein his expert testimony, based on research, had settled the issue for the jury.

This, as Mr. Clark outlined it, was the case of a person's last will and testament—and its authenticity hinged on a time-element. One of the principals went on record that the will itself (written on foolscap) was placed in an envelop when it was written; then some years later the sealed unit was wrapped in another sheet of foolscap to protect it from dust. Mr. Clark revealed how a battered rule on the foolscap proved to him that the document itself and the outside protecting wrapper were printed at the same time on the same press—and the envelope had not been processed until some 30 years afterward.

In closing, Mr. Clark stressed that a professional forger is much more afraid to work on a blank sheet of white paper than all the so-called "fool-proof" stuff on the market. It seems that the forgers have studied the letter's traps, whereas a degree of over-confidence on white paper causes them to leave earmarks like a wide-open book to the paper detectives.

At station WSYR, on Thursday, and routed through a Syracuse University campus unit that is learning the professional ropes, one of the leading ladies of the convention, Miss Helen U. Keily, of the American Writing Paper Corporation at Holyoke, Massachusetts, stepped to the microphone with her own attack on the paper situation. Her supporting cast included G. S. Brazeau, of the Weyerhaeuser plant in Everett, Washington, who is a member of the National Executive Committee, and also, Professor Libby of the New York State College of Forestry.

▶▶▶ During the early session of the clambake, a good representation of the TAPPI crowd played hookey for a round of skeet shooting at the Onondaga Trap and Skeet Club. Honors came out as follows: K. E. Youngchild of the American Cyanamid and Chemical Corporation, Glens Falls, New York, scored 20 out of a possible 25; John D. Haskell of the Dilts Machine Works, Fulton, New York, 19; F. C. Goodwill of the St. Regis Paper Company of Deferiet, New York, tied 15 with S. E. Mower of Wallace and Tiernan, Syracuse, taking 3rd honors on the toss of a coin.

Active in many ways throughout the entire convention was the ladies' committee, which included Mrs. Harold M. Day of Syracuse, chairman; Mrs. John Haskell, Mrs. J. M. Kelley and Mrs. R. F. Huntley, all of Fulton, New York, detailed to prizes; Mrs. F. G. Caulkin of Syracuse, bridge committee; Mrs. C. E. Libby and Mrs. W. O. Hisey, both of Syracuse, flower committee; Mrs. Lyman Beeman and Mrs. Fred Goodwill, both of Deferiet, New York; Mrs. Ronald Hynes of Newton Falls, New York, and Mrs. Henry A. Horstmann of Syracuse, hospitality committee.

As observers looked over the general program, a certain amount of mild-mannered comment was heard to the effect that the program leaned a little too closely toward procurement and supply of pulp and paper. One person, very close to this program, said that this had been done with a weather eye toward the current European war, with a subsequent loss of raw material due to curtailed shipping, submarine warfare, and other features. This, he said, puts the issue directly up to a stepped-up program of American production, an item which hinges directly on this very timely technical drift of program.

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CANADIAN TECH. SECTION CANCELS SUMMER MEETING

Because of the fact that the group visit of the Technical Section of the Paper Makers' Association of Great Britain and Ireland to Canada has been cancelled due to war conditions, there will be no summer meeting of the Canadian Technical Section, it was reported recently. The meeting had been especially planned for the overseas delegation and the British papermakers were to visit both Canadian and American mills during their stay on this continent.

◆

CONVENTIONS AND COMING EVENTS

Oct. 12-13—Packaging Institute, Inc., First Annual Meeting, Edgewater Beach Hotel, Chicago.

Oct. 13-14—American Pulp and Paper Mill Superintendents Association, Fall Convention, Southeastern Division, Durham, North Carolina.

Oct. 16-20—National Safety Congress and Exposition, Atlantic City, New Jersey.

Oct. 21—Southern States Pulp and Paper Club, Fall Meeting, Charleston, South Carolina.

Oct. 27-28—American Pulp and Paper Mill Superintendents Association, Southern Division, Roosevelt Hotel, New Orleans, Louisiana.

Dec. 4-9—Seventeenth Exposition of Chemical Industries, Grand Central Palace, New York City.

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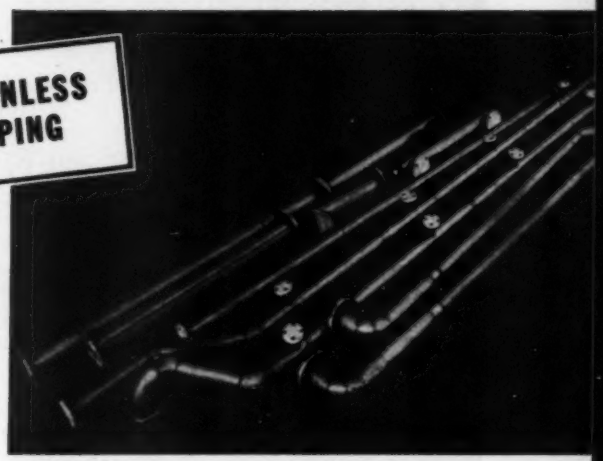

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STANDARD OIL'S "FIRST FIFTY"

One of the most dramatic yet fundamental presentations ever made by an industrial company is a publication recently issued by the Standard Oil Company (Indiana) entitled "The First Fifty." This interesting book of 56 pages and cover has been issued to mark the company's fiftieth anniversary as a leader in developing a power-controlled world.

The fine illustrations in this book, which are accompanied by detailed captions on color plates, in themselves would tell a graphic story of the company, its growth and present activities. In addition, the text provides a most interesting history of oil and its geological origin, as well as the story of how this company, known around the world, has studied nature's golden, powerful liquid and now seeks it out, puts it through the scientific processes discovered through years of research, and releases it to provide power and lubricants for industry.

This unusual publication is the work of F. Lawrence Babcock, former staff writer and associate editor of *Fortune* magazine. He is specializing in the preparation of "business biographies." The pictures used were taken by several well-known photographers, and the finished book in a handsome souvenir cover is indeed a work of art.

◆

NEW PLASTIC PLANT

A new plant for the manufacture of a versatile plastic material used by the manufacturers of coatings, films and plastics is now in operation in Midland, Michigan, according to information received from the Dow Chemical Company. The plant produces "Ethofoil," a clear, glossy sheet material used for window packages, display containers for food stuffs, and other commodities, and "Ethocel," which finds a wide utility in molding plastics, lacquers and other applications.

◆

CHEMICAL SHOW EXHIBITS MANY NEW PRODUCTS

Nearly 300 exhibitors representing over forty industries producing chemical materials and equipment will display their newest products at the Seventeenth Exposition of Chemical Industries to be held December 4-9 at the Grand Central Palace in New York City.

Of interest to those associated with the pulp and paper industry will be the process equipment to be shown in operation including units for crushing and grinding, flow of fluids, materials handling, filtration, drying, evaporation, and distillation. Other classifications of the exposition will include packages, containers and packaging machinery; instruments of precision, laboratory equipment and supplies; pumps, piping and steam process accessories; safety equipment, mill and factory supplies, and coating materials.

Charles F. Roth, president of the International Exposition Company, is directing the show. Permanent headquarters are at the Grand Central Palace.

◆

ALLIS-CHALMERS HONORS 50-YR. MEN

A striking new public relations booklet entitled "We've Gone Places Together" has been issued by the Allis-Chalmers Manufacturing Company in honor of the thirty-eight 50-year men in the company's employ. The booklet, printed in gold, blue-gray and black, pays tribute to the 50-year employees by presenting their pictures and biographies. It opens with a dedication signed by General Otto H. Falk, chairman of the board; Max W. Babb, president, and William Watson, vice

The Dandy Roll Department of the Sinclair Company, Holyoke, Mass., is shown with one of the largest, if not the largest roll ever built. This roll has a 315-in. face; it is 28 inches in diameter, and will operate at 1500 f.p.m. It is constructed of high tensile strength bronze and stainless steel and is covered with special wire cloth woven by the Sinclair Company. It required five weeks to build, and every person in the picture had some part in the construction. The roll was shipped to a large Canadian newsprint mill.

president in charge of manufacturing.

As guests of the company and its Foremen's Club, the men were presented with the booklets at a dinner and celebration tendered them on September 23. In addition to the booklet, each man also received a gold watch appropriately engraved.

◆

T. B. WOOD'S APPOINTS NEW DISTRIBUTORS

The T. B. Wood's Sons Company has recently announced the appointment of several new distributors for its line of V-groove sheaves and V-belts, in addition to standard power transmission machinery.

M. L. Erlenmeyer of Elmira, New York, will handle the Wood's line of V-groove sheaves, belts and power transmission machinery; the Boyer-Campbell Company, Detroit, Michigan, will handle V-groove sheaves, while Berger Brothers, Electric Motors, Inc., of Rochester, New York, will handle both the Wood's sheaves and belts.

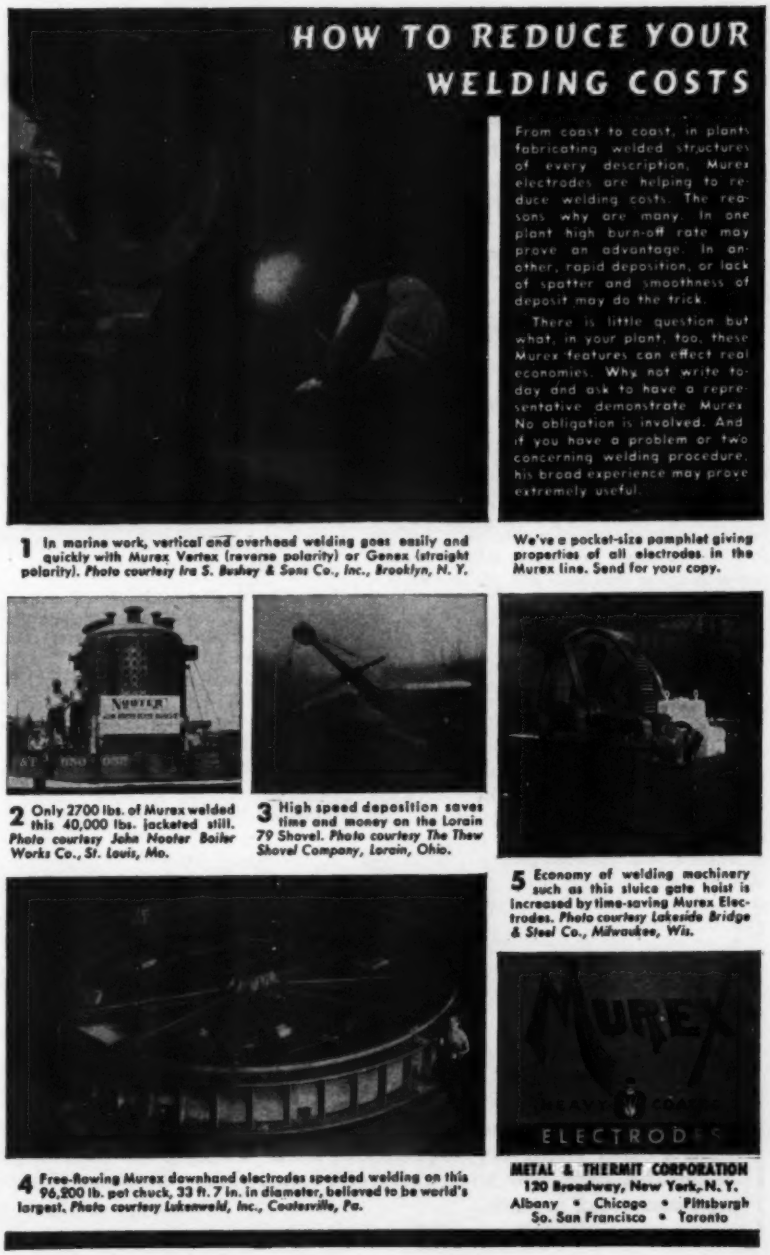
T. B. Wood's Sons Company line of power transmission machinery will be distributed in the Louisville (Kentucky) area through the Louisville Mill Supply Company. In Dayton, Ohio, the M. D. Larkin Company has been appointed distributor for the same line as has Henry D. Clark of Newark, New Jersey, who will handle distribution in the latter area.

◆

▶▶▶ PAPER CARTONS ARE HARMLESS TO HEALTH and otherwise suitable for use as milk containers, according to testimony introduced recently before the federal master in chancery in Chicago. Occasion for the testimony was the case of the Fieldcrest Dairies against the City of Chicago. The City has an ordinance against sale in anything but glass bottles. According to the *Chicago Tribune*, an official of the Gardner-Richardson Company, Middletown, Ohio, asserted that the ink used on the outside could not penetrate to the contents. This assertion was backed by a chemist from the company manufacturing the ink used on the carton.

◆

▶▶▶ A NEW RECORD was established by the American Rolling Mill Company's Middletown (Ohio) plant on September 12, when it rolled 809 tons of strip during an eight-hour turn. This exceeds all known production records previously made, it was asserted. None of the strip was over 56 inches wide.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1 In marine work, vertical and overhead welding goes easily and quickly with Murex Vertex (reverse polarity) or Genex (straight polarity). Photo courtesy Ira S. Bushey & Sons Co., Inc., Brooklyn, N. Y.
We've a pocket-size pamphlet giving properties of all electrodes in the Murex line. Send for your copy.
2 Only 2700 lbs. of Murex welded this 40,000 lbs. jacketed still. Photo courtesy John Nooter Boiler Works Co., St. Louis, Mo.
3 High speed deposition saves time and money on the Lorain 79 Shovel. Photo courtesy The Thew Shovel Company, Lorain, Ohio.
5 Economy of welding machinery such as this sluice gate hoist is increased by time-saving Murex Electrodes. Photo courtesy Lakeside Bridge & Steel Co., Milwaukee, Wis.
4 Free-flowing Murex downhand electrodes speeded welding on this 96,200 lb. pot chuck, 33 ft. 7 in. in diameter, believed to be world's largest. Photo courtesy Lukenweld, Inc., Coatesville, Pa.
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STRONG SUPER TRAP

The Strong, Carlisle & Hammond Company of Cleveland, Ohio, recently delivered what is believed to be one of the highest pressure traps in the world, to the United States Bureau of Mines. The bureau is conducting experiments on the hydrogenation of coal and for their special apparatus they required a mechanical trap capable of withstanding 5,000 pounds of pressure and resisting the effect of ammonia and hydrogen sulphide.

The specially built trap will discharge liquid products contained by the hydrogenation of coal, from 5,000 pounds pressure to atmospheric pressure. The valve and seat of this super trap are of Anum metal, the same alloy used in regular Strong traps, valves, etc.

◆

▶▶▶ A MILLION-DOLLAR PLANT will be erected by the Goodyear Tire and Rubber Company at St. Mary's, Ohio, according to a report in a recent issue of the *Chicago Tribune*. The report stated that the Goodyear organization plans to complete the one-story modern structure by January 1 and that mechanical rubber goods will be manufactured there.

Convention Papers . . . Abridged

Stains for Determining the Degree of Cooking, the Degree of Bleaching, and the Purity of Pulp

JOHN H. GRAFF
The Institute of Paper Chemistry

In staining fibers with ferric chloride-ferricyanide-Benzopurpurin, with combination of basic and direct dyes, or with basic dyes alone, the absorption of the salts and dyes depends upon the relative amount of lignin and other impurities in the fibers, whereas the direct dyes are absorbed by the cellulose. Therefore, the color reactions of the fibers when stained by these salts and dyes depend upon the relative amount of lignin and cellulose in the fibers.

The Bright stain does not differentiate between unbleached and bleached fibers, but it is an excellent and quick method for determining the uniformity and total amount of cook of an unbleached pulp.

The cooking or bleachability stain (modified Seibert and Minor stain) is an accurate method for determining the degree of cook of a pulp, regardless of the pulping method or raw material used, and it can also be used for determining the uniformity of the cook of a pulp; but the stain cannot be used to determine the relative amount of unbleached and bleached fibers in a furnish.

The bleach stain reaction of pulps gives a direct colorimetric evaluation of the degree to which a pulp has been bleached; it can also be used for determining the dyeing characteristics of rayon, but it has no value as a microscopic stain.

The Lofton and Merritt stain differentiates between ordinary unbleached softwood sulphite and sulphate but, because of the many new pulping methods, it will, in many cases, be misleading for this purpose. The stain cannot be used to determine the relative amount of unbleached and bleached fibers in a furnish; however, because of the variations in density of the color reactions, depending upon the relative purity of the individual fibers, it is an excellent microscopic stain for the determination of the uniformity of purity, both of unbleached and bleached pulps.

All of these stains give much more uniform and dependable color reactions when a small amount of pulp is stained or dyed under standard conditions in beakers than when the staining is done directly on the slide.

A Study of the Drainage Characteristics of Paper Making Fibers

C. H. HEIGL and W. O. HISEY
New York State College of Forestry

This research constitutes an approach to the problem of drainage of water from suspensions of paper making fibers from the standpoint of the laws of fluid flow. A simple derivation from Poiseuille's Law leads to the following formula for the case in which a constant rate of flow is being maintained through the sheet which is being formed from uniform fiber suspension:

$$P = KVW^2 m R_s$$

in which: P = pressure drop across the forming area
K = a constant
V = rate of flow per unit of forming area
W = weight of fiber deposited per unit of forming area
m = viscosity of the suspending liquid
R_s = specific resistance of the fiber mass to passage of the suspending liquid

Experimental evidence indicates that the formula is valid. If fibers were completely non-compressible the specific resistance, R_s, would be constant for any given pulp under different forming conditions, but since the fiber mass is compressible under the stresses set up during formation of the sheet, R_s tends to vary with conditions of sheet formation. Further study of these variations is being undertaken.

The change in specific resistance of a fiber mass with beating is very large. Solka No. I Soft Alpha pulp, beaten from an original freeness (Canadian Standard) of 790 cc. to a final freeness of 180 cc., gave a specific resistance in the beaten form more than 150 times as great as that of the unbeaten pulp. The drainage factor of the beaten pulp, determined according to T205m-36, was 56 times as great as that of the unbeaten pulp. It therefore appears that the freeness test is not a true indication of the drainage characteristics of pulps, and that the drainage factor is of much greater value for this purpose.

Relation Between Delignification and Strength Characteristics of Very Raw Pulps

HARRY F. LEWIS and
CHARLES A. RICHARDSON, II
The Institute of Paper Chemistry

A very raw spruce pulp containing 22.2 per cent of lignin made by the neutral sulphite process has been delignified by the kraft process to yield four pulps having 17.7, 15.9, 12.7, and 8.6 per cent of lignin, respectively.

Physical tests and swelling studies have been made on these pulps. The physical

The papers presented at the fall meeting of the Technical Association of the Pulp and Paper Industry, Syracuse, New York, September 12, 13 and 14, 1939, have been digested and are so published herewith. Another installment of these digests will appear next month.

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tests showed that, as the lignin content decreased, the strengths of the beaten pulps increased to give a maximum at the low lignin value. At the same time such characteristics as shrinkage, apparent density, and porosity of the handsheets made at a freeness of 250 cc. also increased with the decrease in lignin. Stiffness, on the other hand, decreased with decrease in lignin content.

Swelling pictures showed rather characteristic structural differences between the pulps. The two pulps having the highest lignin values were swollen only a relatively small amount by cupramonium solution, and in no case was there any ballooning. The two pulps containing the intermediate lignin contents (15.9 and 12.7 per cent) exhibited more swelling and some ballooning. The pulp with the lowest lignin content (8.6 per cent) and the highest strength characteristics showed considerable ballooning and solution of the fiber in the swelling agent. The swelling behavior indicated that the fibers of the first two pulps were covered with a coating of stiff, non-swelling, and non-elastic lignin. As delignification proceeded, this gradually dissolved with the consequent liberation of cellulose surfaces of an increasing number of fibers. When the lignin content decreased to 8.6 per cent, it appeared as though the outer lignin sheath had almost entirely dissolved and the residual lignin was located mainly within the secondary wall of the fiber.

Yield and Viscosity of Holocellulose and Some of Its Cellulosic Fractions

WM. G. VAN BECKUM and GEO. J. RITTER
U. S. Forest Products Laboratory

A study was planned to supplement data on the yields of holocellulose and some of its cellulosic fractions with data on the state of degradation of the materials. It was believed the combined information might suggest means for improving present-day pulp qualities as well as pulp yields. The state of degradation of the materials was measured by determining their viscosities in cuprammonium solution for comparison.

The various cellulosic fractions of holocellulose consisted of Cross and Bevan cellulose, hydrolyzed holocellulose, their alpha celluloses, alpha cellulose from holocellulose, two bleached sulphite pulps and their alpha celluloses.

The data show that, on the basis of the wood, a higher yield and a higher quality of alpha pulp can be obtained from the holocellulose than from any of the other cellulosic materials mentioned above.

The Location of Potential Reducing Substances in Woody Tissues

S. COPPICK[1] and W. FRANK FOWLER, Jr.[1]

Studies on the location of the various chemical components in the woody plant cell wall have been impeded by a lack of suitable specific stains. It has been shown that dyes commonly employed in histological work are very unreliable in that their action in most cases is of a selective absorptive nature.

The present study is based on a standard chemical precipitation test for reducing substances. The action is a modification of Tollen's ammoniacal silver nitrate reagent, wherein the ammonia is replaced by a 3 per cent solution of ethanolamine in 95 per cent alcohol to facilitate reaction at room temperature.

Treatment of wood with chlorine water liberates or generates reducing substances which precipitate silver from the reagent in the cell wall. The location of the precipitated silver in the cell wall, when compared with studies on the action of various lignin and cellulose indicators and solvents and with polarized light studies, indicates that the reactant is associated with or is a part of the lignin complex, quite likely the lignin-hemicellulose complex.

(1) Graduate Student, New York State College of Forestry.

Relation of Lignin Content to the Strength of Paper and Boards— I. Literature Survey and Progress Report

EDWIN C. JAHN[1] and C. V. HOLMBERG[2]

The relation between the chemical composition of the fibers of a paper sheet and its physical characteristics is still largely a matter of conjecture. However, we do know

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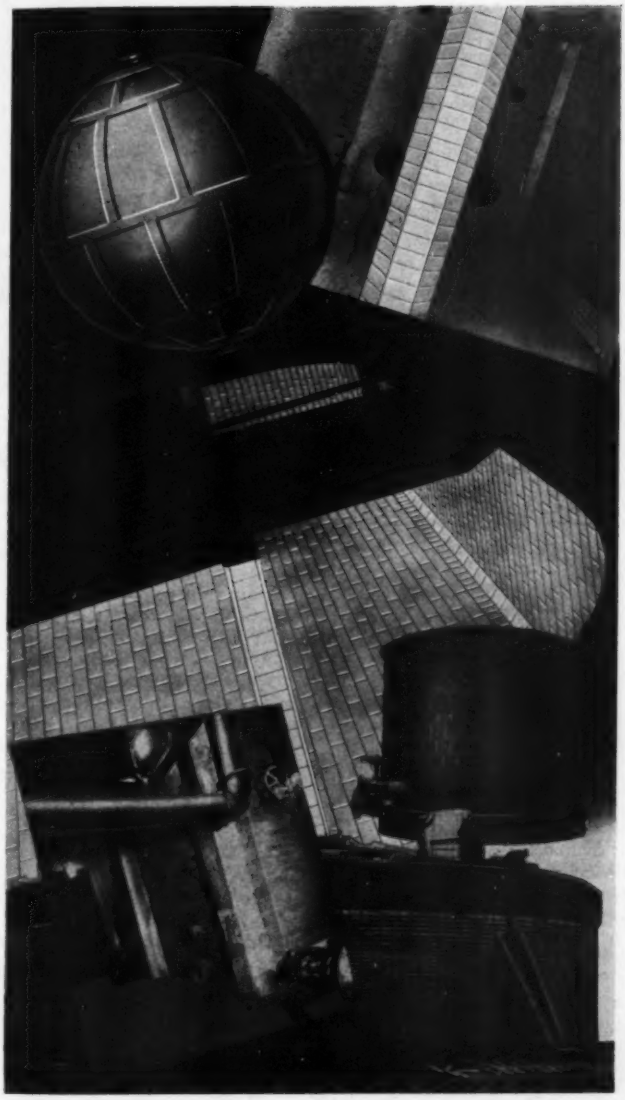

Impurities and foreign substances, originating within the pulp or paper mill, often find their way into paper stock and the finished products themselves. They are responsible for a large percentage of the "rejects" and, sometimes, for the loss of a good customer.

Metallic particles from machines — rust specks from poorly lined steel vessels, small pieces of rubber from rolls, hose, etc.— scale from metal pipes—slivers and slime from wooden chests—and fragments of cement, brick or tile from tanks and vessels supplied with inferior ceramic linings—all militate against the production of the clean stocks and clean papers which make—and hold—satisfied customers and may greatly affect your profits.

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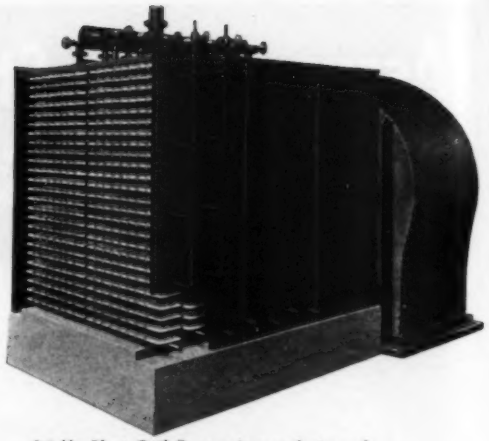

Stickle Blast Coil Economizer and view of horizontal radiation section. Send for booklet 20-A giving complete description

• This Stickle Blast Coil Economizer uses condensate from the driers to heat air in large volumes for conditioning drier felts and heating and ventilating the machine room. Its use increases production, reduces full consumption and reflects further economy in decreased over-all conversion cost per ton of paper manufactured. It is used on book, writing, news and board machines.

Booklet 20-A, "How to Dry Paper, Heat and Ventilate a Machine Room" gives a complete description, and is well worth reading by any paper mill man who is interested in obtaining a more favorable production situation without making a heavy investment.

The Stickle Blast Coil Economizer is a cost reducing unit of the Stickle Drying System, and is often installed in combination with the Stickle Tension and Thermal Control and Stickle Micro Drainage System. One of our engineers will be pleased to check with you without obligation.

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a great deal about the effect of various chemical treatments, especially the conditions of cooking and bleaching, upon the papermaking properties of the treated fibers.

One reason why a definite relationship between the chemical constituents of the fiber and its papermaking qualities has not been evaluated is the difficulty of so doing.

The chemical composition of the cell walls of xylem tissue in relation to the microstructure of the wall is still a controversial subject. There is general agreement among investigators, however, with regard to the larger visible structure of the wood fiber wall and, to a lesser extent, regarding the chemical composition of its major parts.

Chemically, a lignified cell wall, such as a wood fiber, is made up chiefly of cellulose, hemicelluloses (polysaccharides and polyuronides) and lignin. The total wall may be considered essentially two interpenetrating systems, i. e., a matrix of crystalline cellulose among the interstices of which are deposited amorphous lignin and noncellulosic constituents. The compound middle lamella is heavily lignified, and this region and the outer parts of the secondary wall appear to contain most of the lignin, whereas the secondary wall is high in cellulose content but contains some lignin throughout.

Chemical pulping is considered essentially a delignification process, although not all the lignin is removed and most of the less resistant carbohydrates are.

The literature on the relation of the various chemical constituents to physical properties of pulp sheets is meager. Frequently a chemical analysis (alpha cellulose, furfural, ash, extractives, copper number, residual lignin) is made of a pulp for correlation with its physical properties. Chemical and physical data serve to characterize a pulp better than physical tests alone. However, the effect of the individual chemical components of the fiber on its properties is largely a matter of opinion. It is best not to confine the discussion to lignin only, because in most instances other components as well as physical variables are also involved.

Insofar as chemical composition affects the strength of paper and boards made from lignified fibers, it is likely that the physical properties are not controlled by one chemical constituent. The influence of lignin-polysaccharide complexes, pentosans, polyuronides, cellulose and lignin in relation to each other, and in relation to the position of their occurrence in the fiber should not be lost sight of.

Because of the practical desirability of relating this work to commercial pulps and processes, it is essential to study a series of partially delignified pulps following commercial methods, and also to study commercial pulps low in lignin content. Theoretical considerations demand that conditions of delignification be followed which affect the other constituents as little as possible. The following series of pulps are being studied:

Sulphate pulps: series of cooks, in which the time is varied, on eastern white pine mechanical pulp to give pulps of different lignin content, from 23.7 to 3 per cent.

Sulphite pulps: series of cooks, in which time is varied, on eastern white pine chips to give pulps of different lignin content, from very raw to well cooked pulps.

Chlorinated pulps: series of eastern white pine mechanical pulps given different number of chlorination treatments.

Commercial unbleached and partially delignified pulps: lignin content reduced to zero in stages by mild delignification.

Delignification of eastern white pine mechanical pulp by Schmidt's chlorine dioxide procedure, giving a series of "holocelluloses" of differing lignin content.

(1) Professor of Forest Chemistry, New York State College of Forestry (2) Graduate Fellow, New York State College of Forestry.

A Method for the Measurement of the Angle of Contact Formed Between a Liquid Surface and a Fiber, and the Application of This and Swelling Data to Pore Diameter Measurements

JAMES E. FOOTE
The Institute of Paper Chemistry

The effective pore diameter of the capillary system contained in a sheet of paper is important in studying the penetration of liquids into a sheet. A measure of the pore diameter can be obtained by means of the Lucas equation:

(*Continued on Page* 782)

INTERESTING USES OF ALKALIES

Preserving Firmness In Canned Tomatoes

The appearance and value of canned whole tomatoes are enhanced if the flesh is kept firm so that the vegetable may be literally rolled out when the can is opened. Scientific research has recently discovered that the introduction of small quantities of calcium chloride gives tomatoes this desirable firmness. From 30 to 60 grains per 100 pounds are all that is needed. The calcium may be applied to the material or placed in the can in the form of concentrated solution. The beneficial effect is not limited to tomatoes but is applicable to many canned and frozen fruits and vegetables.

The amount of calcium chloride required for the above purpose is infinitesimal as compared with its uses for dust control, refrigeration, or concrete curing. Small, too, are many of the uses made of COLUMBIA Caustic Soda and Liquid Chlorine as compared with the tonnage consumed daily by the paper industry. Yet, no matter what your requirements, whether for one drum, or cylinder, or thousands of tons, your inquiry will receive careful, technical consideration, and your order prompt and accurate delivery. That's one reason why the paper industry likes to specify COLUMBIA.

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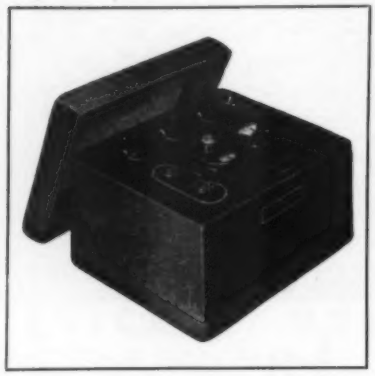

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$$D = 4\kappa\eta/\omega,$$

where D = pore diameter,
η = viscosity of the liquid,
ω = surface tension of the liquid, and
κ = constant.

The value of κ can be determined by studying the rate of capillary rise of a liquid in a strip of paper.

This equation does not, however, take into consideration the swelling action of the liquid and the angle of contact formed between the liquid and the fiber. By application of these factors the accuracy of the method should be improved.

Two strongly swelling liquids (formamide and water) and two which dissolved rosin readily (alcohol and benzene) were used. The second two were used so that determinations on rosin-sized sheets could be made. The quantitative swelling data for water, formamide, and alcohol were taken from the work of Kress and Bialkowsky.

To measure the angle of contact a microprojection method in which individual fibers were dipped into a liquid surface was developed.

It was found that on the application of the swelling and contact angle data the results obtained by the Lucas equation could be rationalized. The effect of the swelling and the contact angle was clearly shown.

Alcohol appeared to give the most correct value. The angle of contact is zero and the short time required to complete a determination reduces the swelling effect to a negligible factor. Alcohol can be used on rosin-sized and nonrosin-sized samples with equal success.

Some very interesting facts were found in the contact angle studies. Quite extensive data indicate that alcohol always formed a zero angle of contact. This condition also prevails on more limited data for formamide and benzene. Water, on the other hand, gave values greater than zero. The angle is increased by impurities in the stock, rosin sizing, and certain surface sizing materials.

An increase in the TAPPI size test is concomitant with an increase in the angle of contact.

Cross-sectional Dimensions of Fibers in Relation to Papermaking Properties of Loblolly Pine

J. C. PEW, Associate Engineer
and
R. G. KNECHTGES, Formerly Assistant Scientific Aid
U. S. Forest Products Laboratory

The large variation in wall thickness between fibers in the springwood and in the summerwood of the southern pines has generally been recognized as an important factor in the pulping of these woods. In the work on the pulping of southern pine at the Forest Products Laboratory, information was obtained on the cross-sectional dimensions of the fibers in several types of the wood. Although it was not possible in the present instance to make an extensive investigation, the number of observations was sufficiently

Cross sectional dimensions of fibers in loblolly pine samples selected from shipment 1459

Disc No.[1]	Relative height above stump[2]	Disc properties[3]			Specimen properties[4]				Average dimensions of fiber cross sections[5]											
		Springwood by volume	Growth rate	Specific gravity oven-dry weight per green volume	Springwood by volume	Growth rate	Specific gravity oven-dry weight per green volume		Springwood						Summerwood					
							Springwood	Summerwood	Outside dimension		Inside dimension		Wall thickness		Outside dimension		Inside dimension		Wall thickness	
									Radial	Tangential	Radial	Tangential	Radial	Tangential	Radial	Tangential	Radial	Tangential	Radial	Tangential
	Per cent	Per cent	Rings per inch		Per cent	Rings per inch			Microns	Microns	Microns	Microns	Microns	Microns	Microns	Microns	Microns	Microns	Microns	Microns
M-1	12.5	51	2.6	0.505	41	2.9	0.58	0.64	49	46	43	40	3.3	3.3	40	40	17	26	6.6	7.8
M-6	75.0	70	2.2	.411	60	2.5	.58	.66	49	46	43	39	3.3	3.6	32	40	19	25	6.4	7.4
M-8	100.0	85	2.1	.369	80	2.2	.59	.63	47	43	40	37	3.1	3.0	29	38	18	24	6.7	6.9
J-2	20.0	44	11.4	.577	40	10.0	.59	.78	50	46	44	39	3.1	3.5	28	44	14	22	6.8	11.0
J-8	80.0	57	9.1	.479	62	12.0	.55	.78	52	46	47	41	2.7	3.7	26	45	11	21	7.5	12.0
J-10	100.0	66	7.4	.440	72	9.6	.53	.66	52	48	46	42	3.1	3.1	25	43	14	23	6.3	9.2
J-2	33.4	64	2.7	.460	54	3.5	.58	.68	44	46	36	37	4.1	4.3	34	41	17	21	6.7	9.9
J-4	50.0	65	2.1	.381	60	1.8	.58	.49	49	46	43	40	3.0	3.1	38	48	26	32	6.8	7.4
J-6	76	76	2.1	.419	72	2.4	.54	.75	44	42	37	35	3.4	3.7	34	45	18	25	7.8	10.0
K-4	80.0	80	1.9	.347	81	2.4	.56	.67	48	40	42	34	3.1	2.9	31	37	17	21	7.0	7.8
Spruce			21.1		82	24.0			32	33	27	28	2.6	2.7	18	32	7	19	5.7	6.5

[1]The letter indicates the tree, the numeral indicates number of the 4-foot log from the butt cut. Discs were cut from the top ends of the logs. . . . [2]Based on total merchantable length as 100 per cent. . . . [3]Average for entire disc. . . . [4]Average for 1½-inch cubes cut from disc at a distance of about two-thirds of the radius from the center. . . . [5]Each value is an arithmetic average of approximately 800 measurements. . . .

large as to indicate certain interesting relationships.

Fiber measurements in transverse sections of second growth loblolly pine of both rapid and slow growth rates and containing high, medium, and low volume of springwood indicate: (1) Wood of slow growth, on the average, has thicker walled summerwood cells than that of fast growth, but the springwood cells average about the same wall thickness for both types of wood; (2) neither the springwood nor the summerwood fibers vary widely in cross-sectional dimensions with height in the same tree; and (3) both the springwood and the summerwood fibers in trees of the same growth rate class may vary considerably from tree to tree in the average cross-sectional dimensions at points of equivalent springwood content.

It seems evident from this investigation that the classification of the wood according to the growth rate and the springwood—summerwood ratio only is not sufficient to characterize completely the material for pulping purposes, but that the relationship of the springwood-summerwood ratio to the specific gravity must also be taken into consideration.

Planted Red Pine as Related to Pulpwood Yields North and South

E. F. McCARTHY,
Professor of Silviculture
New York State College of Forestry

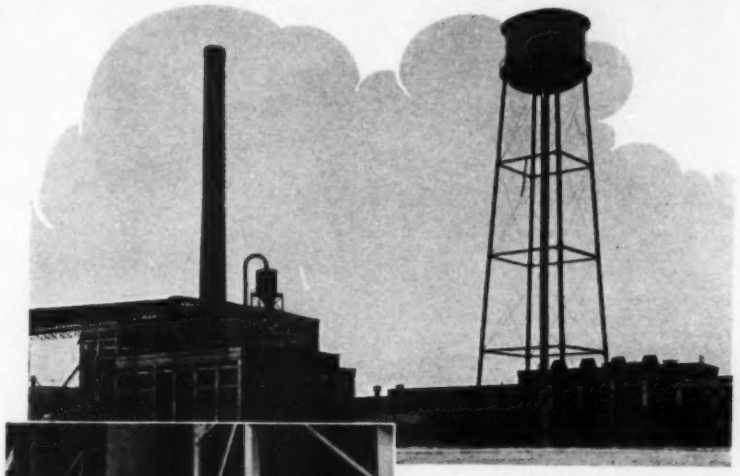
The experience of more than thirty years with plantations established in this State makes possible at this time a reasonably accurate estimate of the relative value of species for plantation purposes. In planting idle land, both private individuals and the State itself have used principally softwoods successfully.

One of the oldest plantations of red pine is located on the property of the Great Bear Springs Company between Fulton and Phoenix. This plantation was established in 1909 and consecutive measurements have been made in it at intervals. In the five-year period previous to 1937, this stand grew at the rate of 302 cu. ft. per acre per year. The average annual increment throughout its life is about 140 cu. ft.

Another stand of timber was measured at York, Pa., on the property of the York Water Company. This stand, the plantation being established in 1914, grew at one time at the rate of 230 cu. ft. per acre per year, but during the past ten years has averaged only 162 cu. ft. per acre, showing thereby that it has begun to stagnate.

In 1915 students of the New York State Ranger School at Wanakena in the western Adirondacks planted 15 acres of red pine on the forest property attached to the school. This land had been cut over for all merchantable material and burned subsequently in the year 1908. The trees were planted about 6 ft. apart with a mattock without other preparation of the site. The stand received no subsequent care until 1927, when a small amount of voluntary growth of hardwoods was removed. On the advent of the CCC program the trees were pruned to a height of about 16 ft., but no thinning was done until 1938.

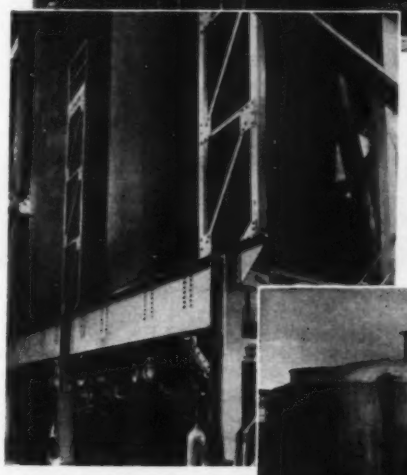
STEEL TANKS and PLATEWORK
for one of the South's new pulp mills



Above: 100,000-gal. ellipsoidal-bottom elevated water tank used for sprinkler service at the new Container Corporation pulp mill.

• • •

Left: Two 12 ft. diam. by 45 ft. welded steel digesters, built in accordance with Paragraph U-68 of the A. S. M. E. Code for Unfired Pressure Vessels.



Right: Two 33 ft. diam. by 13½ ft. high tanks, used for black liquor storage.

THE accompanying views show some of the equipment which we fabricated at our Birmingham plant for the Container Corporation's new pulp mill at Fernandina, Fla.

In addition to the elevated tank, digesters, and flat-bottom liquor tanks illustrated here, we furnished hot water tanks and a 16 ft. diameter cyclone of welded construction.

This is but one example of the type of work being fabricated regularly by our shops for the paper industry. Whenever you are contemplating the installation of storage tanks or steel plate work of any kind, write our nearest office for estimating figures. We will be glad to submit quotations, without obligation to you, on the most economical designs to meet your requirements.

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Los Angeles.....1459 Wm. Fox Bldg.
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WOOD

This plantation has been completely successful except where destroyed by frost in the lower lying lands. The trees are very sturdy in form and 35 to 40 ft. high. The largest diameter is approximately 10 in.; the average diameter, about 6 in. As in the case of the Great Bear Springs and York plantations, these trees have made a better annual increment in the past than they are making at the present time. Crowding, due to too great density, began at about seventeen years of age.

Comparison can be made with production of wood in the South by reference to the growth and yield studies furnished by the United States Forest Service. These records clearly show that the best natural stands of pine in the South will furnish a yield per acre quite comparable to that of our Northern red pine, this in spite of the fact that the growing season is longer and the temperatures higher.

There is no doubt that we can obtain growth rates of more than 250 cu. ft. per acre per year with planted stands of red pine, but this will not persist long unless thinnings are made early in the life of the stand.

Foresters have almost universally insisted on the maintenance of crown closure in growing stands of timber in order to hasten the death of the lower branches and consequently increase the quality of subsequent timber. While this method is effective, it is costly in terms of growth, and a better practice will probably be the pruning of the lower log in those trees which are to be reserved for the final crop so that excessive density need not be retained to provide clear timber.

Red pine is found naturally throughout the Northeast and West into the Lake States. Within the last few years a stand has also been discovered on the eastern border of West Virginia which further extended its range to the South. The species has proved to be especially suitable for planting on sites which would be too dry for any of the spruces. On the contrary, it will not occupy very wet lands and has shown some unfavorable results when planted on heavy clay soils. It is not as susceptible to frost damage as Norway spruce or the white spruce, nor is it as resistant to frost damage as the Scotch pine or the jack pine. On the whole, the species is much less subject to injury by insects and fungi than white pine or the Norway and white spruces.

The supply of red pine is small up to this time, but is increasing rapidly through planting. The Conservation Department of the State reports 138,000,000 red pine trees distributed from its nurseries from 1909 to 1938 inclusive. A report covering the years 1929 to 1935 showed that red pine comprised about one-third of the 134,833,549 trees used in planting under the Hewitt Bill.

The paper and pulp industry can assist materially by demonstrating the possibility of using red pine for pulp. Without doubt there is at the present time a sufficient quantity of planted softwood timber in the State to furnish two or more pulp mills with a continuous supply of pulpwood. The difficulty lies in the large variety of species used in the plantations and the scattered location of those plantations. Here again the pulpwood industry can, by furnishing centers of consumption, guide the selection of species in establishment of future plantations. The whole program should be coordinated about the processing plant.

The Suitability of Red Pine for the Manufacture of Sulphite Pulp

JOHN STUDENY[1] and C. E. LIBBY[2]

According to statistics published in 1927 (Wells and Rue, U.S.D.A. Bulletin 1485), three groups of coniferous woods, the spruces, firs and hemlocks, furnished 77.2 per cent of the total wood consumed by the U. S. pulp industry.

The picture has changed considerably since 1927, and last year's government statistics (U. S. Tariff Commission report to U. S. Senate on wood pulp and pulpwood. Rept. 126, 2nd series, page 249), revealed that the southern pines alone constituted 22 per cent of the total pulpwood consumption.

Within a relatively short span of time, a great southern pulp industry has developed, utilizing the southern pine for pulpwood.

The northern states, too, have a pine species indigenous to this area, capable of producing a volume increment of wood cellulose per unit of land area, that compares favorably with that of the southern

pines. This species, variously called red, Norway, and hard pine *(Pinus resinosa)* was studied intensively during the past year.

With a view primarily of aiding the pulp mills of New York state, the problem was narrowed down to the sulphite pulping of the red pine wood.

The work was undertaken with a view toward producing a strong unbleached sulphite pulp from red pine, suitable particularly for newsprint sulphite, in the hope that during the progress of the research work it might be possible to determine the optimum cooking conditions for the production of an easy-bleaching grade of sulphite.

The young red pine wood used in most of the pulping experiments was obtained from a thinning operation on the New York State Ranger School Forest at Wanakena, N. Y. This 23-year old wood came from trees averaging 35 feet in height and ranging from 5 to 9 in. in diameter, breast high. The older (46 years of age) wood used in the experiments, was obtained from the College forest at Warrensburg, N. Y.

Red pine fiber dimensions are somewhat shorter than the Southern pines, but longer than most of the spruces.

On the basis of a chemical analysis by the authors, red pine cellulose from young trees should be suitable for the manufacture of pulp.

The preliminary pulping experiments on young red pine wood were confined to a study of the following variables upon the resulting pulp: Maximum cooking temperature; alkali base used for the liquor; cooking time; preliminary impregnation time.

The liquor used in all cooks was a high-free SO_2 liquor, adjusted to the following analysis: 6.30 per cent total sulphur dioxide; 5.00 per cent free sulphur dioxide; 1.30 per cent combined sulphur dioxide.

The Palmrose iodate method was used with all cooks, for the analysis of both raw and relief liquors. A liquor ratio of 6 to 1 was used; thus for every charge of 3000 g. of chips (oven-dry basis), 18 l. of liquor having the above composition were added to the digester.

On the whole, our cooking experiments proved that red pine is very easily pulped, and that a high-free sulphur dioxide liquor will penetrate the wood very rapidly.

Young red pine wood does not contain too large an amount of pitch to obviate its use for sulphite pulp.

The wood is easily reduced by the sulphite process, at temperatures of 135-140 deg. C., a 2-hour penetration period being sufficient.

Yields of about 45 per cent are obtainable with 10-hr. cooks, while the shorter 8-hr. cooks give somewhat higher yields of less pure pulp.

Soda base liquors give dark colored pulps which are harder to bleach than either those prepared with calcium or dolomitic base liquors.

The high pitch content of the mature red pine prohibits its use for sulphite pulp, under the conditions used in this work.

Pulp prepared from mature wood contained a very large amount of pitch and probably large amounts of residual lignin.

While strong physically, the pulp obtained in all cooks was very hard to bleach.

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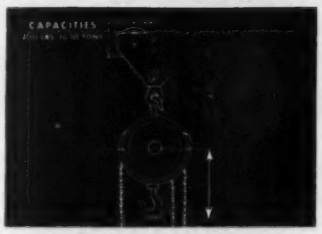

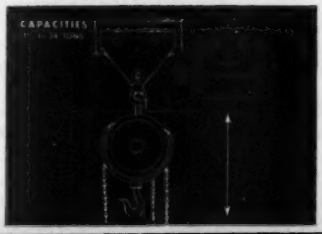

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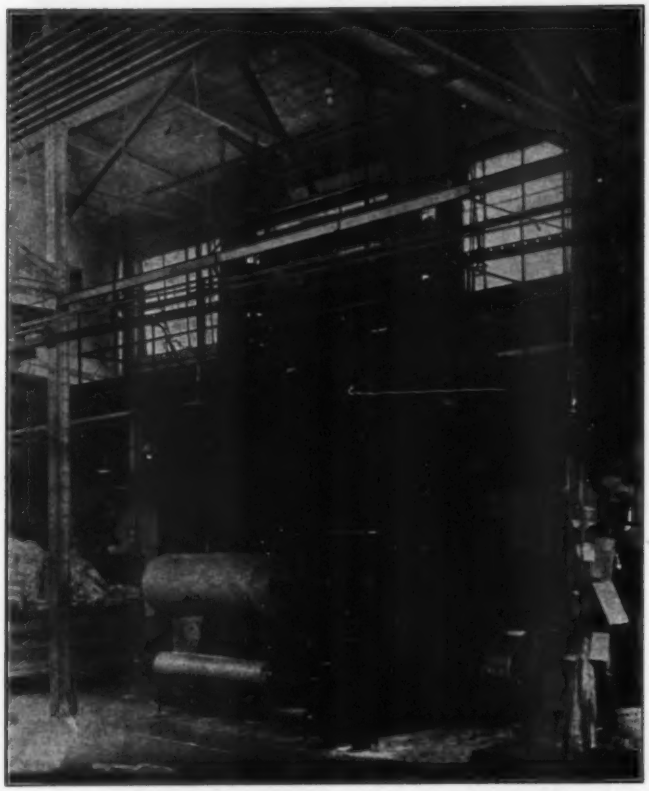

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A pronounced tendency to redden after standing overnight, was observed on the pulps prepared from mature red pine.

While young red pine was easily delignified at 135-140 deg. C., the temperature necessary to give the best pulp with the mature wood was 150 deg. C.

(1) Formerly graduate assistant, New York State College of Forestry; at present technical assistant, American Writing Paper Corporation.
(2) Professor of Pulp and Paper Manufacture, New York State College of Forestry.

The Absorption of Sulphur Dioxide in Water

L. C. JENNESS[1]
and
J. G. L. CAULFIELD[2]

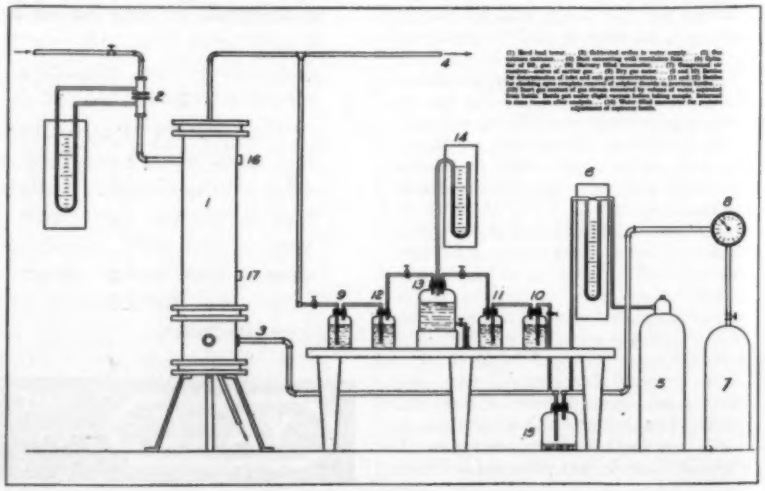
A number of values of the coefficient of absorption of SO_2 in water have appeared in the literature, covering a variety of tower packing materials and a wide range of liquid velocities, gas velocities and temperatures. [Haslam, Ryan, and Weber, Trans. A. I. Ch. E., 15, 177, (1923); Haslam, Hershey, and Kean, *Ind. Eng. Chem.*, 16, 1224, (1924); Adams, *Ind. Eng. Chem.* 25, 424, (1933); Reiley, *Tech. Assoc. Papers*, 22, No. 1, 527, (1938).]

In brief, the theory of the absorption of a gas in a liquid, based upon the two-film conception first proposed by Whitman [Whitman, *Chem. Met. Eng.*, 29, 147, (1923)] is as follows: when a gas is in contact with a liquid in which it is more or less soluble, a particle of gas entering solution in the main body of the liquid must pass through two stagnant films, one of gas and the other of liquid. The resistance to the absorption SO_2 in water is considered to be divided between the two films, the distribution depending upon such circumstances as relative liquid and gas velocities, temperature, etc.

The assumption of Henry's Law is often made in the case of sulphur dioxide and water, and is sufficiently valid for relatively high leaving concentrations of gas. Its application to the low exit gas concentrations met with in the present investigation leads to serious error, due to the fact that sulphur dioxide solutions fall far short of obeying Henry's Law at very low concentrations, the curve expressing equilibrium values of vapor pressure and liquid concentrations being decidedly concave upward.

The apparatus employed was that permanently installed for class instruction in gas absorption in the Chemical Engineering Laboratory of the University of Maine and consisted of a hard lead tower six inches in internal diameter and packed with one inch clay Raschig rings to a depth of 19 inches.

In determining the value of the overall coefficient of absorption the sulphur dioxide-air mixture, adjusted to the desired concentration, was admitted to the bottom of the tower and water allowed to flow in at the top at the proper rate. When the system had reached equilibrium, readings



(1) Associate Professor of Chemical Engineering, University of Maine, Orono, Maine.
(2) Assistant Professor of Pulp and Paper Technology, University of Maine, Orono, Maine.

Back to page 40, Aunt Matilda...

we're not ready for you yet

Question: When "show-through" from page 40 jumps in and spoils the reading on page 39, who's called on the carpet?

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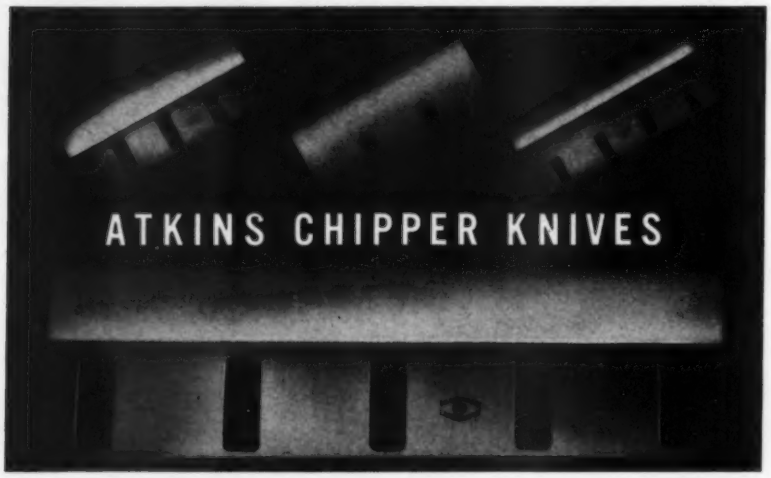

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were taken of air rate and water rate, and the inlet and outlet gas streams were analyzed over a period of time sufficient to insure steady conditions. Pressure and temperature readings were taken at the point at which the gas was analyzed and in the tower. Temperature in the tower varied from 10 deg. C. to 16 deg. C., superficial gas velocity from .037 ft. per sec. to 0.30 ft. per sec., and superficial water velocity from .09 ft. per min. to 0.69 ft. per min. Inlet gas varied from 10.9 per cent SO_2 by volume to 18.9 per cent SO_2 by volume. As great ranges of both gas and liquid velocities were covered as the limitations of the apparatus would permit. The tower effluent was not analyzed, it being felt that more reliable values could be obtained through basing all analyses on the gas stream.

The coefficient of absorption of sulphur dioxide in water was found to vary at fixed liquor velocities as a power function of the gas velocity, the exponent of the gas velocity increasing with increased liquor velocity. The coefficient also was found to vary as a power function of the liquor velocity at fixed gas velocities, with higher values of the exponent occurring at higher gas velocities. Resistance to absorption was found to be appreciable in the liquid film at low liquid velocities, but to shift to the gas film at high liquid velocities.

Effect of the Wood-Stone Contact Area in the Groundwood Process

E. R. SCHAFER, Engineer
and
J. C. PEW, Associate Engineer
U. S. Forest Products Laboratory

In an effort to arrive at a better understanding of grinding-zone relationships a series of experiments was conducted on the Forest Products Laboratory experimental grinder. In successive experiments with spruce wood in the form of rectangular blocks, the blocks were arranged in one, two, and three stacks, respectively, first in one pocket, then in two pockets, and finally in three pockets, making a total of nine experiments. All other conditions were maintained as nearly constant as possible from run to run. The pit temperature was held at 150 deg. Fahr. by means of a grinder temperature controller and the consistency was controlled by manipulating the temperature of the shower water. Pressure was maintained at 40 pounds per square inch of wood-stone contact regardless of the area involved. The pulps were tested according to tentative standard Forest Products Laboratory method No. 96.

In general, the results indicate that increasing the total area of contact both by charging more blocks per pocket width and by putting more pockets into operation improved pulp properties in most respects up to a maximum point approximately equal to two-thirds of the total available area. Why poorer results are obtained beyond this point is not readily apparent, but certain theoretical considerations offer a plausible explanation.

From the standpoint of commercial grinder design, it might appear that the total arc of wood-stone contact desirable for high-

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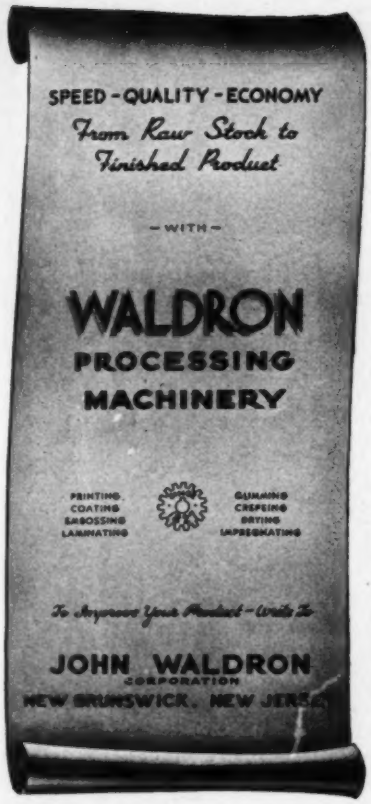


est efficiency is limited by other operating conditions. The study also suggests that in working with small areas, as in miniature grinders, unit pressure is not of fundamental importance but rather that the pressure should be adjusted so as to maintain normal wood advance with relation to stone surface speed.

Effect of Rate of Feed of Wood to Stone at Various Stone Surface Speeds in the Groundwood Process

E. R. SCHAFER, Engineer
and
J. C. PEW, Associate Engineer
U. S. Forest Products Laboratory

Conflicting opinion exists among producers of groundwood pulp as to the effects of the rate of wood-feed and of the surface speed of the grindstone. Very wide variations in the rate of wood-feed are employed in commercial practice.

This paper presents the results of experiments in which the effect of the wood-feed rate and also the effect of the rate of speed of the stone surface were determined by direct control. The experiments were conducted in the Forest Products Laboratory experimental grinder.

The stone of this machine can be driven at six speeds by means of a two-speed motor and a three-speed reduction gear. In the present experiments only four speeds, distributed over the whole range, were used. They were approximately 3,160; 4,220; 5,040; and 6,740 feet per minute.

Rectangular blocks of white spruce wood were ground using the central or vertical grinder pocket only.

At each speed, advance rates of wood to stone were selected so as to allow four different lengths of travel of stone surface for a given thickness of wood ground. These lengths were 1.5, 3.0, 4.5, and 6.0 feet of stone surface per 0.001 inch of wood advance. The unit of 0.001 inch was selected because of its approximation to the diameter of a wood fiber. The rate of 3 feet of stone surface per 0.001 inch of wood corresponds to average commercial practice.

The conditions of the experiments, other than speed and feed rates, were maintained as nearly constant as possible. Pulps were tested according to the standard Forest Products Laboratory methods.

It appears that when a given length of surface is used to remove a unit thickness of wood, increase in stone speed has no direct influence on the unit energy consumption of the pulp but decreases pulp strength. When the ratio surface speed to wood advance is relatively high, this strength decrease is substantial; but when the ratio is low, the effects are small. The average pressure necessary to maintain a given ratio of surface speed to wood advance rate tends to decrease with increasing stone speed. The average pressure, as would be expected, also decreases as the speed-feed ratio increases. It does not necessarily follow that the loss in strength prohibits the use of high speed grinding since the advantages of increased production may more than offset this disadvantage.

Increasing the length of stone surface passing the wood per unit of wood advance, at a constant stone speed (that is, decreasing the wood advance rate) resulted in pulps of increasing bursting strength, tensile strength, and solid fraction, and of decreasing freeness, but at the expense of unit energy consumption and production rate. The average fiber length was only slightly affected. The greater lengths of stone surface passing the wood apparently permit a processing of fiber to occur before detachment from the wood.

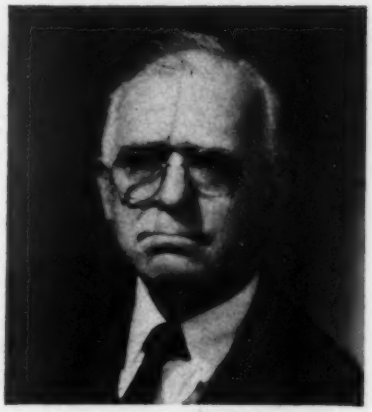
Growth Factors Influencing the Value of Jack Pine for Kraft and Sulphite Pulps

G. H. CHIDESTER[1], M. W. BRAY[2] and C. E. CURRAN[3]

Jack pine is now used extensively in the production of bleached and unbleached kraft pulp in the Lake states.

The production of sulphite pulp from jack pine by the ordinary procedure presents certain difficulties generally attributable to the heartwood. Under the ordinary procedure the heartwood is not completely reduced to pulp, so that a relatively large amount of screen rejections and a low yield of pulp result. In the past, some jack pine has been used for the production of newsprint pulp. The results, however, have been somewhat unsatisfactory owing to these heartwood difficulties.

Experiments at the Forest Products Laboratory have recently indicated the possibility of much improved results with reasonably complete reduction of the wood by employing the customary calcium bisulphite liquor



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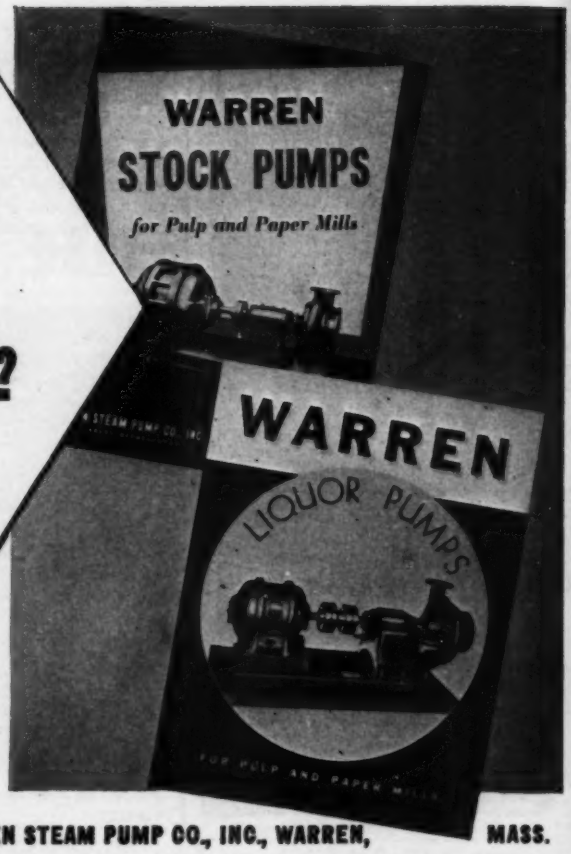

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containing a relatively high sulphur dioxide concentration and a longer cooking time at lower temperatures.

To determine the most effective cutting methods for jack pine pulpwood, the Division of State and Private Forestry of the north central region of the U. S. Forest Service, Milwaukee, Wisconsin, recently conducted selective cutting experiments in co-operation with the State of Minnesota and a paper company. Cost and volume studies were made on approximately 400 cords of each of four degrees of cutting (approximately 30, 40, 60 per cent and clear cutting) from a 48-year-old even-aged stand grown under natural conditions. Further studies are planned to determine the annual growth, the mortality, and the reproduction on each of the thinned plots over a 10-year period.

Pulping data were obtained on samples of about one cord each of 8-foot bolts from trees of several diameter classes (5, 7, 9, 11 inches d.b.h.). The wood properties and the yield and quality of pulp were determined for each of the segregated samples.

The various samples were prepared for cooking in the usual manner by chipping, screening, and mixing thoroughly to obtain representative samples of ⅜-inch chips. The chips were kept in covered cans in a cold room until used.

Sulphate digestions were made in triplicate under identical conditions in spherical, steam-jacketed, rotary autoclaves of 3.7 gallons capacity.

Sulphite digestions were made in duplicate or triplicate by suspending chips contained in perforated baskets, in a 50-pound pulp capacity digester.

Strength tests were made on both sulphate and sulphite pulps according to the standard Forest Products Laboratory beater method. Unbleached sulphate pulps were analyzed for their cellulose, alpha cellulose, lignin, pentosan contents, and their chlorine consumption. Unbleached sulphite pulps were tested for their chlorine consumption, and for their solubility in ether and in an alcohol-benzene mixture.

All types of growth pulped equally satisfactorily by the kraft process.

The yields of screened pulp and screenings from the several locations in the trees of different diameter class deviated but little from the general average when considered on a weight basis. When considered on a volume basis, however, considerable variation both as to diameter class and as to position of bolt in the tree may be noticed. Because of the greater density of the suppressed trees and of the lower portions of all the trees, the yields per cubic foot of solid wood were, in general, considerably higher for this material than for the less dense material occurring in the more rapid-growth types and in the upper portions of the trees. On a cord basis the yields of kraft pulps were also appreciably higher for the smaller sizes than for the larger trees.

Position of bolt in the tree with its attendant differences in springwood content, in density, and the like, appeared to play a greater part in determining pulp quality than did growth rate. All the strength properties, including resistance to tear which usually decreases with increase in springwood, showed noticeable improvement in progressing upward in the tree.

Pulps from the 7 and 9-inch diameter classes gave the highest average bursting strengths. The lowest tearing strength was obtained from the 9-inch class trees and from the 3 to 4-inch small top bolts. The small top bolts, however, excelled all others in tensile strength of pulps.

Fairly satisfactory results were obtained by the sulphite process from the several types of jack pine with a 12-hour cooking schedule under the conditions employed. Screenings would probably amount to about 3.5 or 4 per cent under these conditions from woods-run material. The general trend toward large amounts of screenings for higher heartwood contents is evident.

Increasing the schedule to 15.5 hours with a corresponding decrease in temperature should reduce the screenings from woods-run material to less than 1.5 per cent.

The yield of pulp per cubic foot of solid wood decreased as the diameter (rate of growth) increased; the yield from the largest trees was approximately 10 per cent lower than from the smallest. On a cord basis the yields from the two intermediate sizes were appreciably higher than from the two extremes.

The differences in the strength of the sulphite pulps obtained from the different diameter classes were slight. The ether extractives, indicative of the pitch content, were somewhat lower for the two intermediate classes.

Although fairly complete reduction of the

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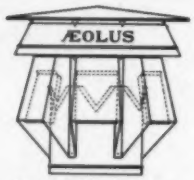

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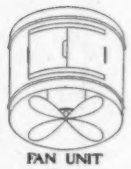
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majority of the samples was obtained with the 12-hour schedule, the most desirable wood for sulphite pulping consisted of the top portions of the larger trees. The middle portions of the smaller trees might be a second choice. The small tops below merchantable size gave perhaps the best results with respect to yield on a weight basis, amount of screenings, and bursting strength. However, the yield on a cord basis was low as a result of the low density, and the cost of preparation would undoubtedly be higher than for the regular merchantable sizes.

Segregation for sulphite pulping according to diameter class should give slightly better results from the intermediate sizes than from the two extremes with respect to the yield on a cord basis, strength, and amount of screenings. This segregation would be slightly less advantageous than a selection of tops or including some of the middles, from the standpoint of strength and screenings, but would give a slightly higher yield on a cord basis.

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(1) Senior Engineer, Forest Products Laboratory (2) Senior Chemist, Forest Products Laboratory (3) Principal Chemist, Forest Products Laboratory.

The accompanying digests are of papers presented at the Division of Cellulose Chemistry of the American Chemical Society, Boston, Mass., September 11-15, 1939.

The Utilization of Waste Lignin

ELWIN E. HARRIS

Chemical research on the fundamental aspects of lignin from waste products in aiding in the solution of this problem. A knowledge of the various external groups, hydroxyl, methoxyl, and unsaturated, aids in foretelling the reactions of lignin. Hydrogenation of lignin suggests a way of converting lignin wastes into valuable products.

The Action of Ozone on Isolated Lignins

RODGER M. DORLAND, W. LINCOLN HAWKINS, and HAROLD HIBBERT

The action of ozone on an isolated lignin, and subsequent decomposition of the resulting ozonide, gives rise to a water-insoluble lignin derivative and an aqueous solution, this latter consisting essentially of a water-soluble lignin-degradation product and oxalic acid. The more prolonged the treatment with ozone, the smaller is the resulting water-insoluble and the greater the water-soluble fraction. This action is accompanied by a decrease in the methoxyl content of the lignin.

Isolated lignins, obtained by extraction with formic and acetic acids, which are normally insoluble in hot aqueous bi-sulphite solution, have been shown to yield soluble lignin sulphonic acids after a prior treatment of the lignin with ozone. Lignin sulphonic acids prepared in this manner from birch wood have been shown to give rise to vanillin and acetovanillone on alkaline cleavage. Presumably this is the first time that acetovanillone has been obtained from a hard wood.

The Absence of the Piperonyl Group in the Lignin Structure

M. J. HUNTER and HAROLD HIBBERT

The absence of the piperonyl group in the structure of lignin is indicated by (a) the inability of workers in this field to isolate from an extracted lignin a piperonyl-containing derivative; (b) the pronounced instability towards formic acid of the formaldehyde-producing constitutent in lignin as compared with the very much greater stability of the piperonyl radical present in known compounds; (c) the liberation of formaldehyde from such derivatives as cinnamyl alcohol, and the probability of the presence of this type of grouping in extracted lignins; (d) the behavior of ethanol sassafras lignin and the water-soluble ethanolysis products from sassafras wood towards hot dilute acids, whereby yields of formaldehyde similar in amount to those found with other woods are obtained from the former, and none from the latter.

Hydrogenation of Lignin in Aqueous Solution

ELWIN E. HARRIS, JEROME SAEMAN, and E. C. SHERRARD

Lignin reacts with hydrogen in an aqueous solution in the presence of Raney nickel to give colorless cleavage products comprising methanol, propylcyclohexane, hydroxy derivatives of propylcyclohexane, alkali-soluble resins, and alkali-insoluble resins.

Heat of Adsorption of Water by Papers

C. C. HOUTZ and D. A. McLEAN

The moisture adsorption characteristics of two papers, one of linen rag derivation and the other kraft process wood pulp, have been stabilized by heating in the dry state at 150 deg. C., so that adsorption isotherms obtained at any temperature from 100 deg. to 150 deg. C. are independent of thermal treatment in the dry state within this temperature range.

While the adsorption characteristics of the unstabilized papers are widely different, the stabilization procedure results in very similar adsorption characteristics for the two papers after stabilization. Approximately 120 hours' heating at 150 deg. C. is required to stabilize the adsorption characteristics of the kraft paper, while 40 hours suffices for the linen paper. The stabilization results in a decrease in adsorption which is approximately twice as great for the kraft paper. The characteristics of the

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stabilized papers appear to be reasonably permanent.

A set of isotherms for each paper in the stabilized form has been obtained for temperatures from 100 deg. to 150 deg. C. and equilibrium water vapor pressures from zero to 25 mm. of mercury. Log p-1/T plots of the isosteres, plotted from isotherm data, are linear. Finding the slopes of these curves, total heats of adsorption of water vapor are calculated, employing the Clausius-Clapeyron equation. The heats of adsorption are found to be the same for both papers within experimental error, and a short extrapolation gives 16.1 Kg. Cal. per mole as the heat af adsorption of water vapor on the dry papers.

Effect of Wetting Agents Upon the Treatment of Wood With Aqueous Solutions

ALFRED J. STAMM and WILBUR H. PETERING

Wetting agents have been shown to be of no value in increasing the rate of absorption of water by dry wood, or in increasing the rate of swelling of dry wood under ordinary soaking conditions. This is the case because the rate of wetting is not the slowest of the three factors involved in the take-up of water by wood. Either the rate of capillary rise or the rate of diffusion into the cell walls controls the rate of take-up of aqueous solutions by wood, except perhaps for the first few minutes during which time the water take-up is such a small fraction of the saturation value that it has no practical significance. The reason for the difference in the effectiveness of wetting agents in increasing the water absorption by wood and by a skein of cotton is explained.

Products and Microorganisms Involved in the Thermophilic Fermentation of Cellulosic Materials

F. E. FONTAINE, W. H. PETERSON, and GEO. J. RITTER

A variety of processes which remove the lignin from wood made the cellulose fraction fermentable by thermophilic bacteria. However, removal of the lignin was not a necessary condition for fermentation, since treatment with water or sulphuric acid (1 per cent of the weight of wood) for 15 to 120 minutes at 180 deg. C. left a cellulose residue which was fermentable. Acid treatment was more effective than water treatment. The fact that the cellulose in wood was made fermentable by hydrolysis supports the theory that there is a chemical combination between cellulose and lignin in wood.

Thermophilic fermentation of cellulose by enrichment cultures is the work of a group of associated bacteria. These may be roughly divided into cellulose fermenters and noncellulose fermenters. The fermentation products of the noncellulose fermenters were studied. From glucose these organisms produced lactic, acetic, and butyric acids, the lactic acid subsequently being destroyed with a simultaneous increase in acetic and butyric acids. By purification a culture was obtained which produced 2.5 moles of acetic acid per mole of glucose fermented. This is contrary to the usually accepted theory of glucose cleavage, which assumes a 3-3 carbon split and gives a maximum of 2.0 moles of acetic acid per mole of glucose fermented.

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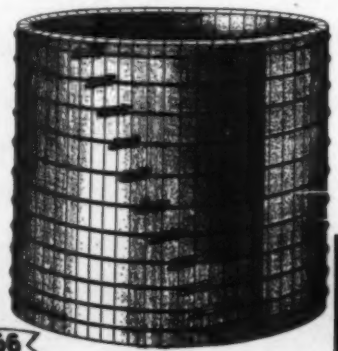

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OTHER COUNTRIES

ARGENTINA EASES IMPORT EXCHANGE RESTRICTIONS

Exchange restrictions applying to imports from the United States have been relaxed somewhat by Argentina, according to a circular issued by the Argentine Exchange Control Office and made public by the Department of Commerce.

It was pointed out that of 173 classes of United States merchandise whose importation has been suspended for the remainder of 1939, permits are now being granted in unlimited amounts for the importation of 62 classes at an exchange rate equivalent to 20 pesos to the pound sterling. Certain grades of paper fall within these classifications. In addition, four classes of United States merchandise for which prior permits had been denied since January 1, 1939, will now be granted permits. The products involved are tin plate, silk yarn, photographic paper, and photographic plates and films.

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It was also learned that certain products from the United States for which limited permits were granted for the second half of 1939 are now to be granted permits in unlimited amounts at the exchange rate of 20 pesos to the pound sterling. Wood pulp is included.

◆

▸▸▸ FOREIGN EXCHANGE TRANSACTIONS in Bolivia were resumed on September 5, according to a report from the United States Department of Commerce. The granting of the exchange is severely restricted and is practically limited to the purchase of necessities.

◆

PHILIPPINES MAY HAVE PULP MILL

The establishment of a pulp and paper mill in the Philippine Islands has been contemplated and is now under consideration by the National Development Company Board, a report stated recently in a Department of Commerce release. It is planned to establish the pulp and paper mill as part of a general scheme for the creation of a chemical industry. Inasmuch, however, as the plan involves the spending of some 14,000,000 pesos and a pulp and paper mill is the only aspect of the plan, it appears that some time will elapse before any definite decisions will be made, the report stated.

◆

▸▸▸ THE BANK OF THE REPUBLIC of Uruguay has announced a special quota of $980,000 of free exchange for imports from the United States, according to a Department of Commerce release.

◆

ITALIAN NEWS

New Cellulose Plant

A new cellulose plant, erected at the end of 1938 at Ferrara, will have a production which will equal that of the Foggia Government works it was reported recently. This means that the new plant will produce about 20,000 to 50,000 tons per year.

The factory occupies an area of about 80,000 square meters and employs about 500 people. Raw material will be shipped from Venice via waterway to Ferrara. The plant will convert rice and corn straw, poplar wood and esparto.

Broom Plant

Italian technicians are now obtaining fibers from the broom plant to replace, in part, those found in jute, flax, and cotton. This is in line with Italy's program of internal expansion.

The best process to obtain a long and clean fiber from the broom plant is based on chemical and enzymatic maceration, according to an Italian corespondent. A particularly important characteristic of this process, it is reported, is the maintenance of the stems in their entirety during the entire cycle.

Cellulose Production

Italian production of cellulose increased approximately 400 per cent between 1934 and 1938, the Department of Commerce reported recently. Italy produced 82,000 quintals of cellulose in 1934 while 1938 production was 406,340 quintals. Figures show that approximately one-third of this latter production was derived from native raw materials other than wood.

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Rails, Plates	Boiler Fittings	Stainless Steel	Floor Plates
Sheets—Strip	Concrete Reinforcing	Babbitt Metal	Safety Tread
Rivets, Bolts			

Write for the Ryerson Stock List.

Joseph T. Ryerson & Son, Inc. Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City.

"Believe It or Not!"

Accidents steal over $1,000,000.00 annually from the paper and pulp industry!

The above almost amazing but quite conservative figure is based on compensation costs alone! All cases and costs included, the total figure is four or five times the cost of compensation. In other words the average total cost of accidents in the paper and pulp industry is about $60.00 per worker per year—equal to the average production cost per ton of paper.

What can be done about it? The National Safety Council has published an interesting little booklet which gives the answer—briefly and concisely. We'll gladly send a copy FREE to any safety director or plant executive on request. Just drop us a line on company letterhead.

PAPER & PULP SECTION

NATIONAL SAFETY COUNCIL
20 NORTH WACKER DRIVE, CHICAGO, ILL.

FOAM

A full line of foam killers designed to cope with almost any foam trouble is now offered by Nopco, specialists in solving foam problems.

Each product is the result of 25 years association with the paper industry — laboratory research and practical mill experience.

When foam problems arise — consult us

NOPCO
EVOLVED THRU RESEARCH

National Oil Products Co.
Harrison, New Jersey
Boston • Chicago
Cedartown, Ga. • San Francisco

PULP BLEACHING COMPANY

ORANGE
NEW JERSEY

CELLULOSE
PURIFICATION

The Paper Industry Safety Contest

July 1, 1939 to June 30, 1940

Out of 181 mills reporting for August, 71 have perfect record

PERFECT SCORES
Division I—Pulp and Paper Mills

PARTICIPANT	MILL	LOCATION
GROUP A		
Price Brothers & Co., Ltd.	Kenogami, P. Q.	Canada
Anglo-Canadian Pulp & Paper Mills, Ltd.	Quebec City, P. Q.	Canada
The Gardner-Richardson Co.	Lockland	Ohio
International Paper Company	Niagara Falls	New York
Paterson Parchment Paper Co.	Bristol	Pennsylvania
Oswego Falls Corporation	Fulton	New York
Nekoosa-Edwards Paper Co.	Port Edwards	Wisconsin
GROUP B		
Quebec North Shore Paper Co.	Baie Comeau, P. Q.	Canada
Thilmany Pulp & Paper Co.	Upper Mill	Kaukauna, Wis.
Consolidated Paper Corp., Ltd.	Belgo, Shawinigan Falls	P. Q., Canada
Champion Paper & Fibre Co.	Houston Division	Pasadena, Texas
P. H. Glatfelter Co.	Spring Grove	Pennsylvania
Price Brothers & Co., Ltd.	Riverbend Paper Mills	Riverbend, P. Q.
International Paper Company	Otis No. 4	Chisholm, Me.
Nekoosa-Edwards Paper Co.	Nekoosa Mill	Port Edwards, Wis.
Hummel-Ross Fibre Corp.	Hopewell	Virginia
St. Croix Paper Company	Woodland	Maine
GROUP C		
Southern Kraft Corp.	Continental Div.	York Haven, Pa.
Strathmore Paper Co.	West Springfield	Massachusetts
Escanaba Paper Company	Escanaba	Michigan
The Eddy Paper Corporation	White Pigeon	Michigan
Strathmore Paper Co.	Woronoco Mills	Woronoco, Mass.
The Crystal Tissue Co.	Middletown	Ohio
Donohue Brothers, Ltd.	La Malbaie, P. Q.	Canada
Ontonagon Fibre Corp.	Ontonagon	Michigan
Bedford Pulp & Paper Co.	Big Island	Virginia
The Mead Corporation	The Harriman Co.	Harriman, Tenn.
The Mead Corporation	Sylva Paperboard Co.	Sylva, N. C.
Consolidated Water Power and Paper Co.	Biron	Wisconsin
Central Fibre Products Co.	Quincy	Illinois
GROUP D		
The Upson Company	Lockport	New York
Lowe Paper Company	Ridgefield	New Jersey
American Writing Paper Corp.	Linden Div.	Holyoke, Mass.
American Writing Paper Corp.	Riverside No. 2	Holyoke, Mass.
Bird and Son, Inc.	Phillipsdale	Rhode Island
American Writing Paper Corp.	Crocker Div.	Holyoke, Mass.
The Flintkote Co.	Little Ferry	New Jersey
Fort Orange Paper Co.	Box Board Mill	Castleton on Hudson, N. Y.
American Asphalt Roof Corp.	East St. Louis	Illinois
American Writing Paper Corp.	Nonotuck Div.	Holyoke, Mass.
American Asphalt Roof Corp.	Kansas City	Missouri
The Mead Corporation	Nashville	Tennessee
Spaulding Fibre Co., Inc.	Milton	New Hampshire
Rayonier, Inc.	Port Angeles	Washington
United States Gypsum Co.	North Kansas City	Missouri
American Writing Paper Corp.	Mt. Tom Div.	Holyoke, Mass.
Crown Zellerbach Corp.	Crown Willamette Paper Co. Div.	Lebanon, Ore.
Consolidated Water Power & Paper Co.	Stevens Point	Wisconsin
Hollingsworth & Whitney Co.	Aroostook & Cobbossee Mills	Gardiner, Me.
Hollingsworth & Whitney Co.	Abenaquis Mill	Madison, Me.
Spaulding Fibre Co., Inc.	Hayes Plant	North Rochester, N. H.
Alton Box Board Co.	Lafayette	Indiana
Central Fibre Products Co.	Vincennes	Indiana
International Paper Co.	Livermore No. 11	Livermore Falls, Me.
Central Fibre Products Co.	Mt. Carmel	Illinois
International Paper Co.	Riley No. 23	Riley, Me.

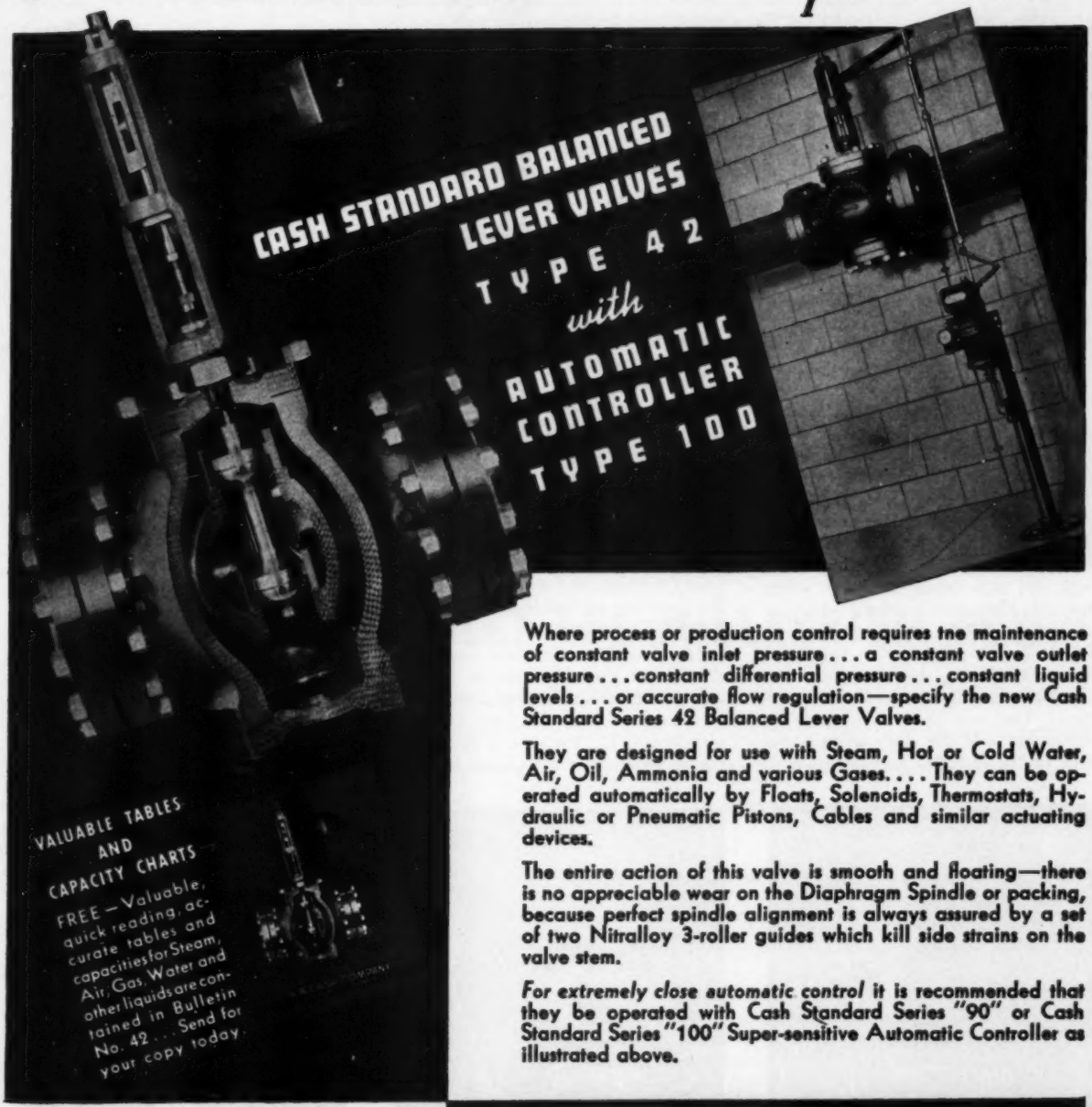
Division II—Paper and Board Re-Manufacturing

Gaylord Container Corp.	St. Louis	Missouri
Chicago Carton Co.	Chicago	Illinois
Container Corp. of America	35th Street	Chicago, Ill.
Union Bag & Paper Corp.	Chicago Bag Factory	Chicago, Ill.
Fort Orange Paper Co.	Paper Box Plant	Castleton on Hudson, N.Y.
The Container Company	Van Wert	Ohio
Barber Asphalt Corp.	Madison	Illinois
Bird and Son, Inc.	Chicago	Illinois
Kimberly-Clark Corp.	Atlas Mill	Appleton, Wis.
Container Corp. of America	Anderson	Indiana
Barber Asphalt Corp.	Barber	New Jersey
Container Corp. of America	Natick	Massachusetts
Bird and Son, Inc.	Shreveport	Louisiana
Gaylord Container Corp.	Houston	Texas
Bay West Paper Co.	Green Bay	Wisconsin

▶▶▶ MAINE STATE Governor's Trophy, awarded to the Maine industrial firm with the best accident-prevention record for the year, was given this year to the Oxford Paper Company, Rumford, Maine at the closing session of the two-day conference of the Twelfth Annual Safety Conference at Portland.

▶▶▶ A PULP STONE BURST recently injured four employees of the Powell River Company, Powell River, B. C. All four were members of the maintenance crew and were working on a pipe line in front of a grinder when the stone burst. The force shattered the housing of the machine and a stream of hot pulp sprayed the men.

UNUSUALLY CLOSE CONTROL OF PRESSURES *Hot or Cold Liquids or Gases*


CASH STANDARD BALANCED
LEVER VALVES
TYPE 42
with
AUTOMATIC
CONTROLLER
TYPE 100
VALUABLE TABLES
AND
CAPACITY CHARTS
FREE—Valuable, quick reading, accurate tables and capacities for Steam, Air, Gas, Water and other liquids are contained in Bulletin No. 42 . . . Send for your copy today.

Where process or production control requires the maintenance of constant valve inlet pressure . . . a constant valve outlet pressure . . . constant differential pressure . . . constant liquid levels . . . or accurate flow regulation—specify the new Cash Standard Series 42 Balanced Lever Valves.

They are designed for use with Steam, Hot or Cold Water, Air, Oil, Ammonia and various Gases. . . . They can be operated automatically by Floats, Solenoids, Thermostats, Hydraulic or Pneumatic Pistons, Cables and similar actuating devices.

The entire action of this valve is smooth and floating—there is no appreciable wear on the Diaphragm Spindle or packing, because perfect spindle alignment is always assured by a set of two Nitralloy 3-roller guides which kill side strains on the valve stem.

***For extremely close automatic control* it is recommended that they be operated with Cash Standard Series "90" or Cash Standard Series "100" Super-sensitive Automatic Controller as illustrated above.**

A. W. CASH COMPANY

DECATUR, ILLINOIS

CASH STANDARD CONTROLS . . VALVES

PERSONALS

CHARLES BOYCE LEAVES THE APPA

At the last meeting of the Executive Committee of the American Paper and Pulp Association on September 13, Charles W. Boyce tendered his resignation as executive secretary of that Association. Mr. Boyce will remain in charge of his duties at the association headquarters until the end of the association year which is marked by the annual meeting next February.

Mr. Boyce's connection with the Association has been such an earnest and constant one since 1928 when he joined the organization, that it is difficult to think of the association without thinking of him.

He came to the Association in 1928 from the U. S. Forest Service, where he had been engaged in economic studies in the paper, pulp and lumber industries for the preceding eight years. He came to the Association as assistant secretary under O. M. Porter, who succeeded Dr. Hugh P. Baker. When Mr. Porter left to go with the Kraft Association in 1929, Mr. Boyce carried on as acting secretary and was made secretary when Jesse H. Neal came to the Association in the fall of 1929 as general manager. In 1932, Mr. Boyce was appointed executive secretary and was made responsible for the Association's activities. That was in the midst of the depression and the Association activities in the industry had declined to an all-time low. In 1933, under the guidance of Sidney L. Willson, Mr. Boyce helped to work out a plan of reorganization of the Association, which was possible then because of the more complete organization of the industry as a result of the NRA. Since that time, the Association has been developed upon new and broader lines of activity.

Mr. Boyce leaves the Association to become vice president of the Northwest Paper Company, Cloquet, Minnesota. His duties there will consist chiefly of assisting the president, Stuart B. Copeland.

◆

▶▶▶ *D. H. Colson,* formerly associated with the Sorg Paper Company, Middletown, Ohio, is now assistant superintendent at Pacific Mills, Ltd., a division of the Crown Zellerbach Corporation, at Ocean Falls, British Columbia. Mr. Colson began his papermaking career in England and has followed it through the mills in that country and in India in addition to his work in Ohio. He spent several months in the Crown Willamette Paper Company plant at Camas, Washington, before going to Ocean Falls.

IMPORTANT CHANGES AT UNION BAG CORP.

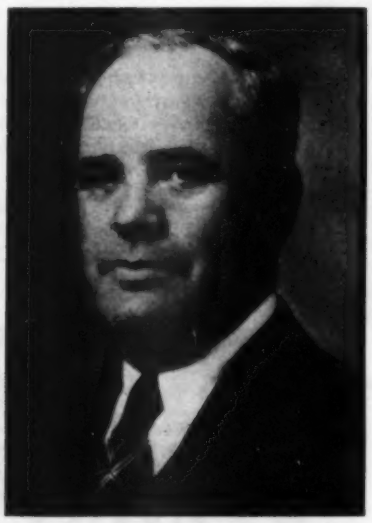
Three important personnel changes were announced recently by the Union Bag and Paper Corporation. The changes involve H. S. Daniels, vice president in charge of sales, who is now vice president and general manager of the corporation; James H. Allen, vice president, a director, and resident manager of Union Bag's Savannah (Georgia) plant, who has resigned; and M. E. Cody, who as of July, 1938, was manager of the Gaylord Container Corporation at Bogalusa, Louisiana, and who is now filling the position of resident manager at Savannah to succeed Mr. Allen.

Mr. Daniels has been associated with the Union Bag organization for the past twenty years, having served as a vice president since 1933 and as director since 1935. He started work with the corporation as a package designer and has worked his way up through all departments of the business to his present position.

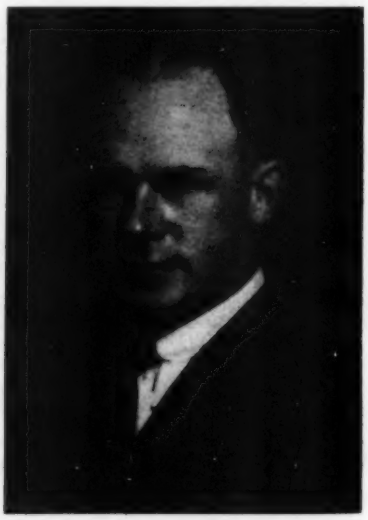
Mr. Allen, a resident of Savannah since the beginning of operations at the Union Bag plant, is to enter the field of forestry development. Mr. Allen, for many years a leader in forestry work in the South, was this spring elected president of the Southern Forestry Conservation Association, and he leaves the Union Bag Corporation to head a new company in the South (See Trade Winds).

Mr. Allen's successor, Mr. Cody, is now in charge of Savannah operations of the Union Bag and Paper Corporation. Mr. Cody enters upon his new duties with a background of twenty-five years' experience in the operation of pulp and paper mills, ten years of which were spent in the South at Bogalusa. He is ably fitted in every way to take over his new work as resident manager.

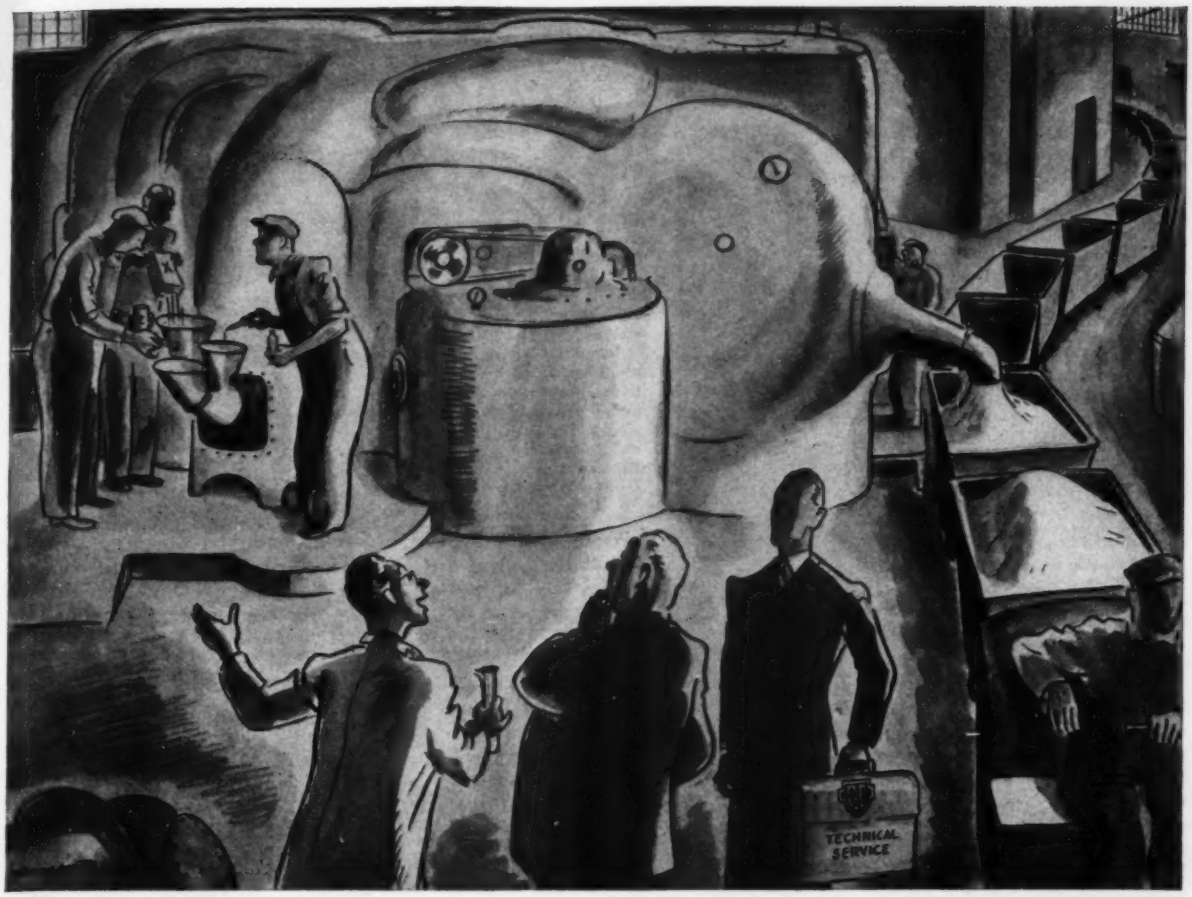
Charles W. Boyce



J. H. Allen



H. S. Daniels



"IT'S PRACTICALLY THE MILLENNIUM NOW!"

It is not to be inferred that a General Chemical Technical Service man is capable of producing a near miracle from his brief case as soon as he enters your plant. . . . But it *is* safe to conclude that the exceptional training and background of the men who compose General's Technical Service Division well qualifies them to analyze your plant situation with possible benefit to your company.

Where there is a problem concerning handling and storage . . . the application of new, old, or even "tailor made" chemicals to a process, or where chemicals influence the design of equipment, these engineers and chemists can be particularly helpful. Often they can make beneficial suggestions though no definite problem has arisen, but where an overall check up in efficiency might be in order.

Because General Chemical Company is the manufacturer of a large number of industrial and laboratory chemicals, which for years it has been helping to apply in industry, your problems are dealt with in the light of the experience of an entire organization.

Your inquiries receive prompt attention and are held in the strictest confidence. Write to

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Executive Offices: 40 RECTOR STREET, NEW YORK, N. Y.

Sales Offices: Atlanta • Baltimore • Boston • Buffalo • Charlotte (N. C.) • Chicago • Cleveland • Denver Houston • Kansas City • Los Angeles • Milwaukee • Minneapolis • Montezuma (Ga.) • Philadelphia Pittsburgh • Providence (R. I.) • San Francisco • St. Louis • Utica (N. Y.) • Wenatchee (Wash.) • Yakima (Wash.)
In Canada: The Nichols Chemical Company, Limited • Montreal • Toronto • Vancouver

◆

Fifty-six Years a Papermaker

After spending 56 years as a paper-mill worker, Jeremiah Hegarty has now retired from his duties at the Mt. Tom Div. of American Writing Paper Corp., Holyoke, Mass. His first full-time job was at the age of 16 when he worked as a reel boy in the Albion mills. He held a succession of jobs in several mills, most of which later became a part of the present AWP Corporation.

HARRIS-SEYBOLD POTTER HAS NEW SALES MANAGER

John C. Dabney, manager of sales research and promotion for the Harris-Seybold-Potter Company, Cleveland, Ohio, has been appointed sales manager of the company's Seybold Division, it was announced recently. The Seybold factory, located at Dayton, Ohio, manufactures precision paper cutters, wire stitchers, drilling machines and kindred equipment. William Kinzler, formerly Seybold sales manager, becomes manager of the central sales district.

John C. Dabney

Mr. Dabney is a graduate of the Harvard School of Business Administration and had been associated with the Standard Oil Company of Ohio and vice president and sales manager of a structural steel firm before he became connected with Harris-Seybold-Potter.

▶▶▶ *W. C. Rodd,* associated for the past fifteen years with the Celotex Corporation, Chicago, is now advertising manager of the company, it was announced recently. Mr. Rodd joined the Celotex organization in 1924 as a sales correspondent, later joining the executive sales staff assisting in the administration of marketing programs, and still later becoming assistant to the vice president in charge of sales.

◆

▶▶▶ *W. J. Zimmerman,* who has been appointed chief engineer for the Abitibi Power and Paper Company, is now located at the head office of the company in Toronto. For several years he was associated with the Mead Corporation and designed and built several mills for that concern.

◆

▶▶▶ *R. B. Moir,* who resigned recently as chief engineer of the W. A. Jones Foundry and Machine Company, has become associated with Foote Bros. Gear and Machine Corporation as director of sales research and engineering development.

◆

▶▶▶ WOOD PULP PRODUCTION for the United States during 1938 aggregated 5,933,560 tons with an f.o.b. mill value of $108,394,204, according to a report issued by the Bureau of Census, Department of Commerce.

◆

▶▶▶ CANADIAN NEWSPRINT MANUFACTURERS have pledged themselves to avoid any attempt to profiteer and to take every precaution to maintain stabilized conditions in the industry during the war, according to Charles Vining, president of the News Print Association of Canada.

KNISLEY SUCCEEDS PAYNE AT A B P

The Associated Business Papers, Inc., New York City, has just made an important announcement. To fill the vacancy in the office of executive vice president, caused by the resignation of H. J. Payne, the ABP announces the appointment of Stanley A. Knisely, advertising manager of the Republic Steel Corporation. Mr. Payne resigned recently to become associated with the F. W. Dodge Corporation.

Mr. Knisely has been closely associated with business papers for the past twenty years. He began his career as a cub reporter on the *Canton* (Ohio) *Daily News.* After several years in editorial work, he became assistant secretary of the National Paving Brick Manufacturers Association, later becoming director of advertising and research of the National Association of Flat Rolled Steel Manufacturers. Mr. Knisely joined the Republic organization in 1934.

◆

YERKES RESIGNS FROM LINK-BELT

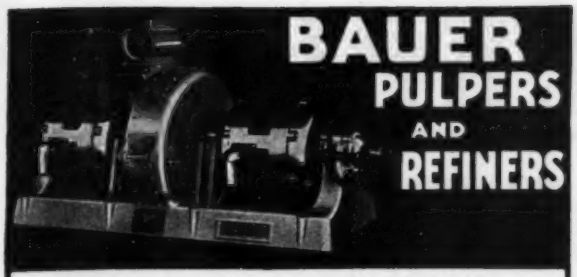
After a half-century of association with the Link-Belt Company, Richard W. Yerkes, secretary-treasurer of the organization, has resigned. Mr. Yerkes tendered his resignation at a board of directors meeting on September 26. His smiling comment was "After half a century's work for the company. I feel that I have earned the privilege of a long vacation and passing my duties on to younger shoulders."

Richard W. Yerkes

Harry E. Kellogg

Starting with the company at Philadelphia in 1890 as stenographer and file clerk, Mr. Yerkes advanced through the administrative departments, having for a long time been sales manager at Philadelphia. While retiring now as a secretary-treasurer, Mr. Yerkes will continue to serve as a member of the board of directors.

Harry E. Kellogg, who has been closely associated with Mr. Yerkes for the last 18 years, has been elected to succeed him as treasurer, while F. V. MacArthur, formerly assistant secretary, was elected secretary.



BAUER PULPERS AND REFINERS

Double-Disc and Single-Disc Machines for stock preparation, semi-chemical, semi-sulphite and all reject refining. Write THE BAUER BROTHERS COMPANY, Springfield, Ohio.

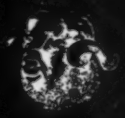
ELECTRICAL & POWER EQUIPMENT

1—625 KVA Allis Chalmers low pressure turbo generator set, 3 phase, 60 cycle, 480/240 volts, 3600 RPM, 16 lbs. abs. or 150 lb. gauge pressure, condensing.
1—750 KVA Cr. Wheeler 3 phase 60 cycle 480/240 volt 600 RPM alternator.
2—300 KVA G. E. 3 phase 60 cycle 480/240 volt 600 and 720 RPM alternators.
9—25 KW to 600 KW 250 volt and 125 volt DC synchronous motor generator sets.
5—300 KVA to 2500 KVA 25/60 or 60/25 cycle synchronous frequency changers.
1—300 HP G. E. 3 phase, 60 cycle, 4000/2200 volt, 514 RPM slip ring motor.
2—300 HP West. New 3 phase, 60 cycle, 440/220 volt 360 RPM slip ring motors.
1—300 HP General Electric 230 volt, 425 RPM direct current motor.

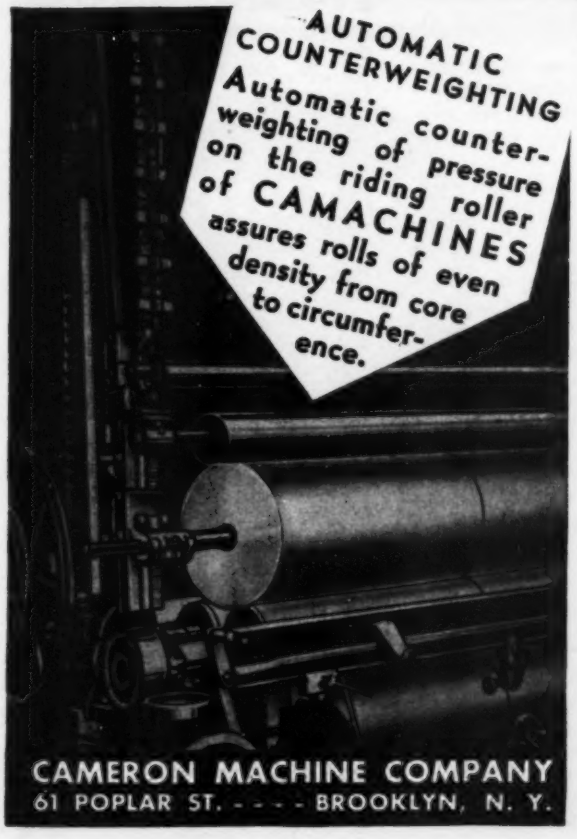
Send For New Illustrated Stock List

CHICAGO ELECTRIC CO. 1324 W. 22nd St., Chicago, Ill.

THE TRADE-MARK OF GOOD FELTS

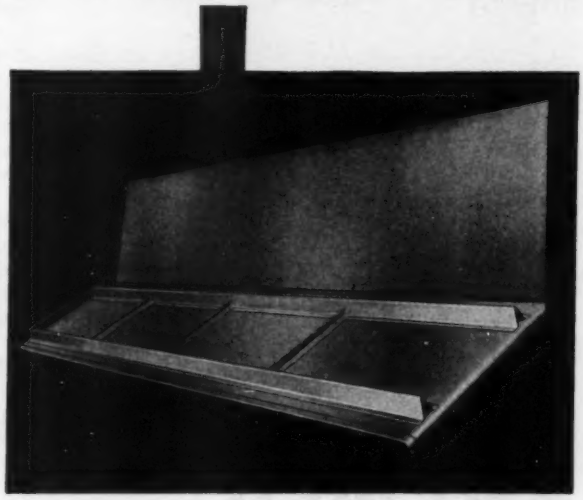


The Waterbury Felt Co.
SKANEATELES FALLS N. Y.


AUTOMATIC COUNTERWEIGHTING
Automatic counter-weighting of pressure on the riding roller of CAMACHINES assures rolls of even density from core to circumfer-ence.

CAMERON MACHINE COMPANY
61 POPLAR ST. - - - - BROOKLYN, N. Y.

where "SAVE-ALL" means A FULL PAY-LOAD



• This save-all pan for a Fourdrinier machine is another example of the many ways ARMCO Stainless Steel can help you produce cleaner paper at lower cost.

Light but exceptionally rigid, trays made of ARMCO Stainless can be easily removed for cleaning. A spray of water and all traces of the previous run disappear. Color stains vanish. What's more, there's no danger of rust-spots spoiling a quality run of paper. This way you can be sure each batch will be a full "pay-load"—free from stains and other impurities.

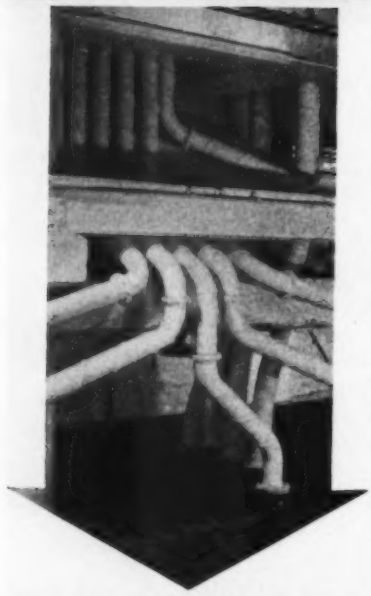
Remember too, save-all trays are only one of many money-saving applications of ARMCO Stainless Steel in paper mill equipment. Use it for Head Boxes, Beaters, Jordan Bars, Stuff Chests, Storage Tanks, Screens—in fact, wherever equipment must protect paper quality and give long low-cost service. There's a special grade for every purpose. Let a trained ARMCO man help you apply it to your needs. The American Rolling Mill Company, 1871 Curtis Street, Middletown, Ohio.

ARMCO

Armco

STAINLESS STEELS

NAYLOR
Lockseam Spiralweld
PIPE



ANSWER
TO LINE JITTERS

Thanks to the exclusive Lockseam Spiralweld structure, Naylor Pipe is vibration-proof. It's the only light-weight pipe with a continuous expansion joint that cushions shock loads and absorbs stresses and strains. Paper mill engineers specify Naylor because long experience has proved the economy of this *different* light-weight pipe, — particularly in slashing maintenance costs. Sizes 4" to 30" in diameter with all type fittings and connections. Complete fabrication service.

WRITE FOR CATALOG NO. 37

NAYLOR
PIPE COMPANY
1236 EAST 92nd STREET
CHICAGO, ILLINOIS

NECROLOGY

WALTER J. BRENNAN

The cause of safety has lost one of its most interesting and helpful personalities. As this issue was ready for the press, word was received of the passing of Walter J. Brennan, who for the past year has been engaged in building up an organization known as the Associated Industries of Maine at Augusta, Maine.

Mr. Brennan was born December 30, 1897 at Augusta, Maine, and passed away in the same city October 4. His career which brought him into the industry began when he went to the St. Croix Paper Company in 1923 as chief chemist. Two years later he was made safety director. In 1932 he left that connection to become director of the newly-organized safety engineering division of the State Department of Labor and Industry, Augusta. The first of the year 1939 marked Mr. Brennan's connection with the Associated Industries of Maine, Augusta, which position he held at the time of his passing. This is a service organization to manufacturers charged with looking after the interests of industrialists. The paper industry is well represented in this group and as executive secretary, Mr. Brennan's long experience with that field and his wide acquaintance made him particularly valuable in this work.

During the time Mr. Brennan was associated with the St. Croix Paper Company he was deeply interested in safety. In 1930 he served as chairman of the Paper and Pulp Section of the National Safety Congress and held important offices on committees during his official connection with the paper industry. After becoming associated with the State of Maine, he continued to attend the meetings of the Section and was vitally interested in promoting safe practices.

Surviving Mr. Brennan are his widow and a son, a brother and sister. Funeral services were held October 6 and interment was at Bath, Maine.

Walter J. Brennan

◆

DONALD M. WESTON

Donald M. Weston, president of the Byron Weston Paper Company, Dalton, Massachusetts, and member of a prominent Berkshire family, passed away September 9 at the age of 48.

Mr. Weston, the youngest and last survivor of ten children, was born in Dalton in 1891. Following the example of his older brothers, his early life was spent in close touch with the paper mill founded by his father. He began work in his father's firm after graduation from the Yale Sheffield Scientific School and was made president in 1934, succeeding his older brother Philip in this position.

Mr. Weston's father was at one time lieutenant-governor of Massachusetts. He founded the Byron Weston organization in 1863. Mr. Weston's maternal great-grandfather was Dr. Peter Bryant, father of William Cullen Bryant, the poet.

Surviving Mr. Weston are his widow, two sons and one daughter.

◆

GEORGE E. BARDWELL

George E. Bardwell, treasurer of the Carew Manufacturing Company, South Hadley Falls, Massachusetts, passed away September 15 at the age of 64. Mr. Bardwell began his papermaking career at an early age and was first associated in the Buffalo sales office of the American Writing Paper Corporation. He is survived by his widow and two brothers.

◆

▶▶▶ *John J. White,* proprietor of the paper converting business in Canton Junction, Massachusetts, known as the J. J. White Paper Company, passed away recently.

We design, build, and equip complete new Plants, ready to operate. Our preliminary suggestions are yours without cost or obligation.

The H.K. Ferguson Co.

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CENTRIFUGAL PUMPS

write for interesting and useful bulletin on Non-Clogging Pumps for handling pulp, and centrifugal pumps for other mill processes and services.
MORRIS MACHINE WORKS, Baldwinsville, N. Y.

THE PUSEY AND JONES CORPORATION

ESTABLISHED 1848

WILMINGTON, DELAWARE

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SOLVAY
Liquid Chlorine

IS *ALWAYS* STANDARD!

When a Company has maintained the most rigid of production standards over a period of 58 years . . . you can rely upon its name and on its products! Scientific methods . . . exacting supervision have made SOLVAY LIQUID CHLORINE a bleaching agent on which you can depend . . . that you can take for granted will be always pure, always uniform, when you receive it!

And when you place your order with Solvay for LIQUID CHLORINE . . . SODA ASH . . . CAUSTIC SODA . . . you are guaranteed fast, sure, on-time deliveries. You are relieved of worry, of check up . . . time spared for your own problems.

Write for full information and prices. Ask for free copy of 44-page book "SOLVAY LIQUID CHLORINE."

SOLVAY SALES CORPORATION

Alkalies and Chemical Products Manufactured by The Solvay Process Company

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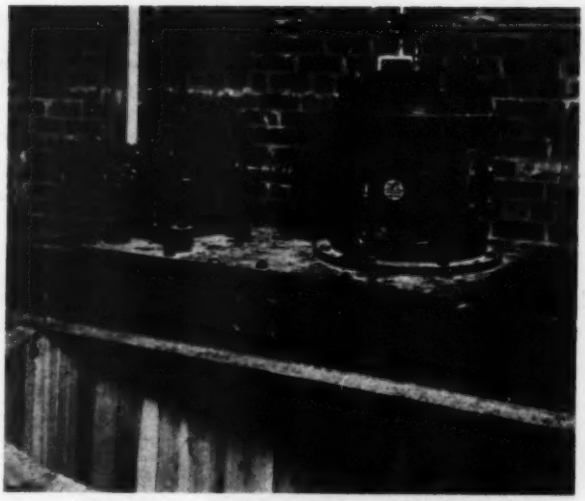

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NEW EQUIPMENT AND SUPPLIES

Oil Flow Indicator

The *Humphrey Flow Indicator,* developed for installation in circulating oil lines on machinery, has been placed on the market by Industrial Instrument Company, 96 East Miller Avenue, Akron, Ohio. The indicator operates in connection with a needle valve in the oil circulating line to a machine bearing, one unit with a valve

being placed in each branch line to a single bearing. Should the oil line plug up between the pump and bearing, the indicating hand on the unit moves to a danger zone marked on its dial to inform operator that something is wrong at that particular bearing. Application can be made on lines carrying pressure to 150 pounds. Over-all dimensions are approximately 2¾ by 7 inches.

Automatic Centrifugal Clutch

An automatic centrifugal clutch for industrial power drives has been developed and is being marketed by Dawes Equipment, Inc., 2280 Penobscot Building, Detroit. The clutch, known as the *D-E Automatic Centrifugal Clutch,* consists of two main parts—

a housing drum, or driven member, and an expansion body or driving member. A steel cover-plate, held in position by means of a lock ring, seals the clutch mechanism against dust, etc. The expansion body consists of six metal segments interconnected by tension springs and operating on individual posts extending radially from the driving hub.

The clutch is disengaged when at rest. As the speed of the driving shaft increases, the expansion body expands outward and the increasing centrifugal force is applied outwardly against the friction lining of the clutch housing drum.

On direct drives the clutch functions both as a clutch and a flexible coupling.

According to the manufacturer, the clutch can be built to engage smoothly at any desired speed and for any horsepower. Likewise, the manufacturer claims that the clutch will operate indefinitely without maintenance.

Strapping Tool

A new strapping tool, designated as the *Ace,* has been announced by The Stanley Works, New Britain, Connecticut. The tool is equipped with an automatic seal feed. Positive spring feed holds the seals in any position. The magazine is loaded with a

clip of 100 seals, available in three sizes, for ¼ in., ⅜ in., and ½ in. strapping. The strapping is fed into the tool, a few quick pulls of a tension lever tightening it. With the strapping tensioned, a second lever is pushed forward, cutting the strapping and automatically sealing it.

Belt Conveyor Idler

Chain Belt Company, Milwaukee, Wisconsin, has developed a ball bearing idler, designated as type B-304, for conveyor widths of 14 inches to 30 inches inclusive on conveyors handling materials of medium weight, such as shavings, wood chips, ashes, etc. The idler rolls are made from 4-inch diameter smooth finished steel tubing with formed heads pressed into and welded to each end. High pressure lubrication is provided for either of both ends of the idler. The troughing idler rolls are supported in ribbed brackets of malleable iron construction, the brackets in turn being supported on an inverted angle base.

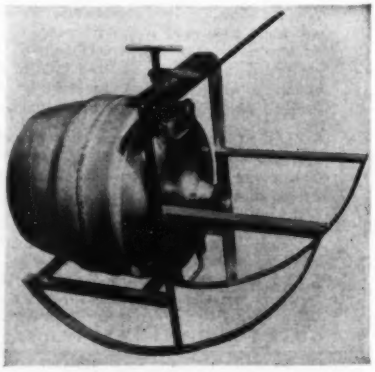
Small Arc Welder

A small motor-generator type arc welder with self-indicating dual continuous current control has been announced by The Lincoln Electric Company, Cleveland, Ohio. The welder, known as the *SA-150,* has both job selector and current control calibrated and equipped with dials which indicate the type of work and number of

amperes for each and every setting, the welder's current range being from 45 to 200 amperes. Complete absence of inflammable materials, such as cotton, linen, fiber, wood, Bakelite, etc., enables the machine to withstand sustained operation under overload conditions. The welder is powered with a "Linc-Weld" squirrel-cage induction type motor for across-the-line starting. Connections are accessible for either 220 or 440 volts, 3 or 2 phase, and 60 or 50 cycles as desired. The machine can be supplied for 550 volts or special voltages. Four steel feet welded to base and drilled permit bolting of machine in stationary installations or attaching three-wheeled running gear. Floor space occupied is less than 4 square feet.

Carboy Pourer

Lewis-Shepard Sales Corporation, 245 Walnut Street, Watertown, Mass., has developed, in co-operation with the Aluminum Corporation of America, a safety type carboy pourer to handle all-aluminum carboys. With the carboy resting on its base, the



pourer is placed over the top and clamped securely by means of a threaded handle just below the shoulder. An easy pull on the handle brings the carboy into pouring position, resting on a broad rocker base. Complete drainage of carboy is accomplished by tilting pourer still further.

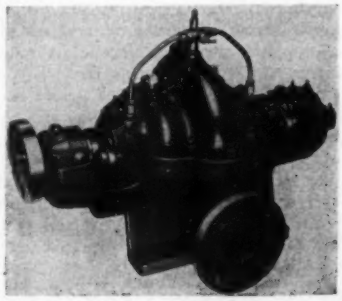
Electric Hoist

A new electric hoist, designated as *"Quik-Lift,"* has been announced by the Coffing Hoist Company, Danville, Illinois. The hoist may be had with either load hook or trolley suspension in capacities from 250 to 4000 lb. It has a fully enclosed, ball bear-

ing motor; lubri-seal ball bearings; alloy steel gears and pinions (sealed and running in oil); non-kinking load chain; limit switches; and shoe type brake with large braking surface. The weight of the hoist, depending upon capacity, ranges from 89 to 195 lb.

Single Stage Pumps Ball Bearing Equipped

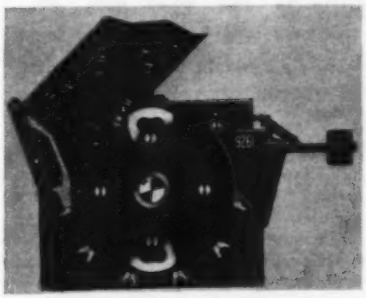
Allis-Chalmers Mfg. Company, Centrifugal Pump Division, Milwaukee, Wisconsin, has announced the inclusion of ball bearings as standard equipment on nearly all its line of single stage centrifugal pumps where peripheral speeds are not excessive and where the quality of the pumps is not



jeopardized thereby. The design is a single row deep groove ball bearing on both ends of the pump in cast iron adapters arranged for grease lubrication. Double row ball bearings may be had at slight extra cost. Lock nuts used on the shaft at both ends hold the ball bearings in place. When the pump is dismantled, the adapters remain on the shaft as units to keep the bearings sealed and protected against damage.

Ring-type Crusher

Stephens-Adamson Manufacturing Company, Aurora, Illinois, has announced a ringe type crusher, featuring triangular shaped manganese steel sectors which are stated to operate so as to crack lumps rather



than crush them. The crusher is marketed in sizes to handle lumps of various types of bulk materials ranging in size from 6 inches to 26 inches. Any unit can be furnished with or without apron fingers to eliminate automatically tramp iron or other foreign materials.

Neoprene Transmission Belt

A Neoprene friction surface transmission belt is being manufactured by the Hewitt Rubber Corporation, Buffalo, N. Y., for application where oil comes in contact with transmission belting. This belt, the result of three years of research and experimentation,

makes use of Neoprene in both the friction and skim compounds rather than rubber, the compounds protecting the cotton duck against wear, ply separation, and softening from oil at high temperatures. The Hewitt trade name for products containing Neoprene, a du Pont base, is Hewprene; and the name given this belt, Duroil Hewprene transmission belt.

Centrifugally Cast Motor Rotor of Copper

Fairbanks, Morse & Company, Chicago, has announced a one-piece centrifugally cast rotor of copper for motors. The rotor is machine finished over all surfaces. One-piece steel fans are welded to the rotor core for open type motors. Fans for splash-proof motors are shaft mounted. The external fans for fan-cooled and explosion-proof motors are cast iron and cast bronze with split hub for ready removal from the shaft extension. The manufacturer states that the rotor, known as Copperspun, is adapted especially to severe service, such as plugging or reversing duty, which demands greater mechanical strengths at abnormal temperatures.

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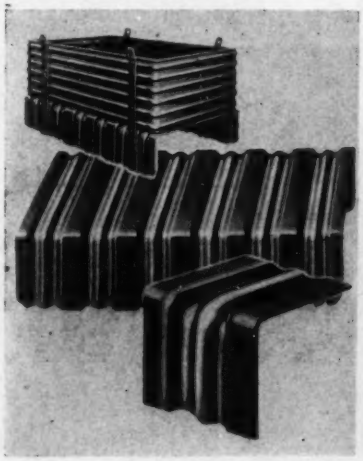
Lift Truck Platform

An all-steel lift truck platform with double corrugations has been announced by The Union Metal Manufacturing Company, Canton, Ohio. The platform is available in customary variations, including a line of corrugated steel platform boxes.



TECHNICAL DEVELOPMENTS

The following abstracts are of the latest developments found in the foreign press.

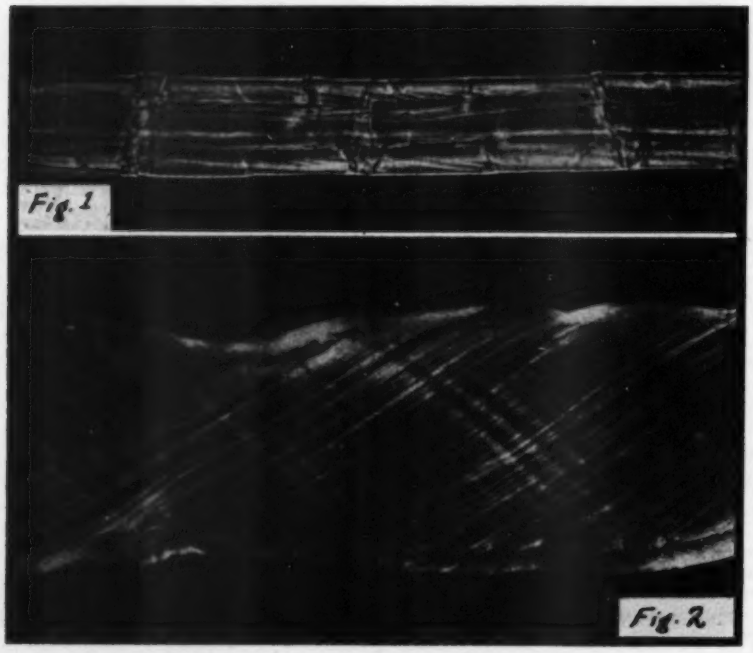
Continuous Sulphite Digestion

The author has given a very brief resumé of his work at Darmstadt. He is concerned with shortening the cook and also with studying the conditions under which the raw material best lends itself to delignification. It was shown for example that "Asplund" mechanical pulp which offers a large surface to the sulphite cooking liquor does not give a satisfactory pulp. The lignin network has been injured, and according to the author this leads to the premature degradation of the cellulose. The sulphite delignification appears to involve a chemical reaction, which first attacks the lignin in the secondary layers and middle lamella, and which proceeds in "strata". It is probable that various pH are found at various points in the cell wall during the cook. Within the lignin layer, this must be 2 (or less than 2) for only at such high acidities could the lignosulphonic acid be satisfactorily removed. In the cellulose "core" the pH must be about 3-4, for if the acidity were higher, the temperatures maintained in the cook would rapidly cause cellulose degradation. These hypotheses have been tested experimentally with pressed wood. In general the pulp shows diminished strength, but this strength is contingent on temperature and time. For example, a stronger pulp is obtained when the temperature is relatively high and the time of cooking is short than when the opposite is true. If the same pressed wood is cooked by the sulphate method, the strength of the pulp is higher than in the sulphite digestion, but in either case certain qualities, like resistance to tear, suffer. It is evident, then, that where the lignin "skeleton" is too harshly interfered with, poorer pulp results. This is also true when undersized chips or sawdust were used in the cooking experiments.

Ideal conditions for sulphite delignification with sound spruce wood seemed to be reached when an evacuated experimental digester allowed the chips to become rapidly impregnated with the cooking liquor, and where the digester was immersed in a glycerine bath, and moved gently to and fro. An hour at 170 deg. maximal temperature then gives "ideal" delignification under these conditions with a normal cooking liquor. Here the resulting pulps contained about 92% alpha cellulose (after bleaching). The author outlines the following stages or factors with which technologists must reckon in devising the "ideal" continuous sulphite digestion: (1) formation of solid lignosulphonic acid; (2) hydrolysis of this acid and its removal at pH 2; (3) hydrolysis of polysaccharides accompanying lignin and cellulose; (4) a slow degradation of cellulose at pH 3-4 with decreased viscosity, and changes in the cellulose micels; (5) an attack on the cellulose provided the original lignin has been mechanically disturbed prior to the cook. L. Grögaard. Papier-Fabr. 37, Tech Tl 283-4 (1939).

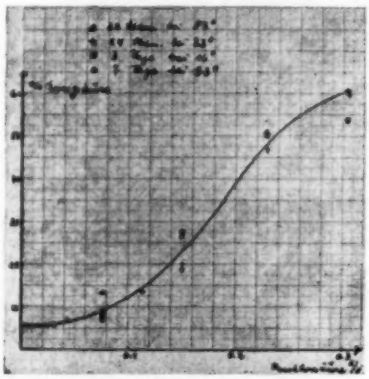
New Technique in Revealing Fibrous Structure

By carefully applying pressure to the coverglass over a fiber on a microscope slide, the author re-examined the structure of flax, ramie, and cotton fibers, obtaining some interesting photomicrographs, which appear sharper than are the ordinary ones. For example: Figure 1 shows a ramie fiber (X 380) under crossed Nicols. Figure 2 shows flax suspended in water and crushed (X 280). Alois Herzog. Wochbl. Papierfabr. 70 Tech-Wiss Tl., 481-5 (1939).



Perchloric Acid Catalyst in Pulp Acetylation

Bleached cotton linters treated with 4 parts each of acetic acid and acetic anhydride and 0.3% perchloric acid during 24 hours at 32 deg. C. gave cellulose triacetate (60% acetic acid). In illustration is shown a curve indicating the rising acetic acid content (Essigsaüre) with increasing amounts of catalyst. Ordinarily the more highly purified is the cellulosic material, the greater is the catalytic action. Standard cotton cellulose is the most readily acetylated; then, in order, follow: linters, purified bast



fibers, and finally technical wood pulps used in rayon manufacture. Chlorides depress the catalytic action of perchloric acid. Magnesium perchlorate acting on cellulose in the presence of acetylating agents, for 7 days at 35 deg., led to a triacetate. Calcium perchlorate is also active, but sodium and potassium perchlorates have little effect. Initial treatment of the cellulosic material with dilute HC1 gave products the catalysis of which was hastened. There is no definite correlation between ash content and catalysis. D. Krüger. Wochbl. Papierfabr. 70 Tech-Wiss Tl., 474-8 (1939).

Alfa, Esparto and Ampelodesma in Pulp Manufacture

Monosulphite cooks were used with these three grasses, growing in North Africa, S. Spain, and S. Italy. The chemical, physical, and microscopic properties of the bleached pulps were studied. Of the three, alfa (Stipa tenecissma) is the most suitable both economically and technologically. Esparto

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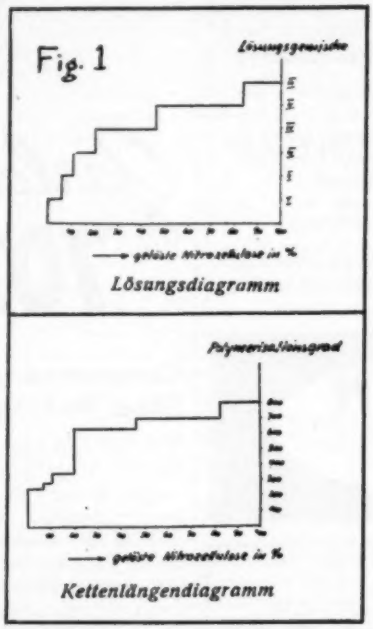
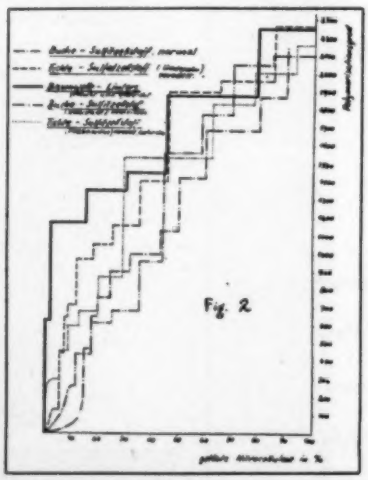
stands next, and ampelodesma (A. tenax) seems the least suitable from the standpoint of cost and yields. Guido Cerchiari. Ind. Carta. 6, No. 5, 173-9 (1939) through Bull. Inst. Paper Chem. 9, 573 (1939).

Distribution of Chain Lengths in Cellulose

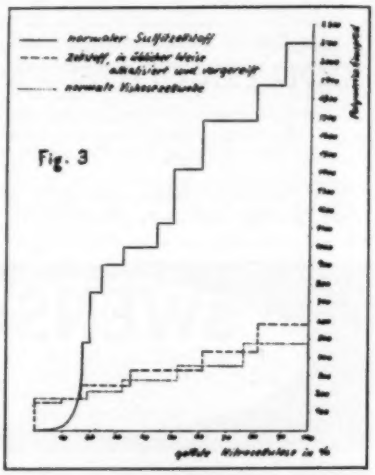
Using various forms of cellulose, the authors by cautious nitration, were able to obtain the esters in such a form that they could be fractionated by the use of a stepwise extraction with alcoholic-ethyl acetate.



The nitration was carried out with phosphoric acid, phosphoric anhydride and fuming nitric acid at 18 deg. C. The degree of polymerization of each fraction determined by Staudinger's viscosimetric method indicated the mean chain length of everyy fraction. Figure 1 shows a solubility diagram



(Lösungsdiagramm) and the corresponding degree of polymerization (chain length) distribution diagram *(Kettenlängediagramm)* in the case of a cell-wool. Comparative data are given for linters (mean degree of polymerization 1680); beech sulphite (d. p. 1550); spruce sulphate (d. p. 1600); and spruce sulphite (d. p. 1750). While these are all high in alpha cellulose (90-99.5%), and despite the fact that the mean d. ps. are not very different, the distribution diagrams as indicated in Figure 2 show marked differences. In this respect there is, for example, a tremendous difference between a normal sulphite and cotton linters. The changes shown in Figure 3 are even more startling. Here are shown distribution diagrams for normal sulphite pulp, alkali cellulose, ripened in air (vorgereift) and normal viscose cell wool. Other diagrams are given and from them certain conclusions



may be drawn which have a distinct industrial bearing. For example a beechwood pulp with 98-99% alpha cellulose was obtained in 35-40% yield by a continuous digestion process without the serious formation of the shorter cellulose chains. The distribution diagrams are of marked value in gaging the properties and usefulness of specific pulps. Walther Schieber, Papier-Fabr. 37, Tech. Wiss. Tl. 245-50 (1939).

Ultraviolet Light and Cellulose

In general, ultraviolet light causes degradation of irradiated substances. However, when cellulose (textile fibers) are treated for very short time periods with ultraviolet light, polymerization is at first effected. This is indicated by increasing strength and lowered copper numbers. The solubility of such irradiated celluloses also decreases (solvent not given). Longer irradiations give rise to oxycellulose with the elimination of CO_2. This formation is contingent on the surface areas of the fibers exposed to such irradiation. Oxidation increases in the presence of certain catalysts. Dyed with some vat dyes, fibers are more readily degraded than are undyed fibers. In certain instances the photolysis of dyestuffs give rise to degradation products which themselves attack cellulose. For example, sulphur black may be oxidized to free sulphuric acid which destroys the fibers. Hans Joachim Henk. Melliand Textilber. 19, 730 (1938) through Papier-Fabr. 37 (Abstracts) 71 (1939).

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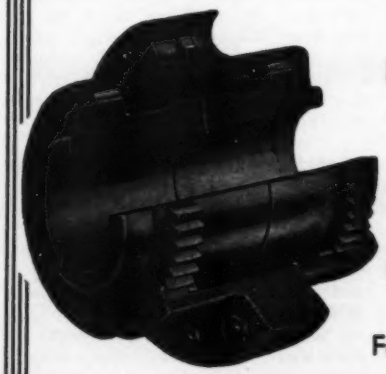

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PAPERMAKING PATENTS

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Inquiries should be addressed to James Atkins, Munsey Building, Washington, D. C.

Cylinder Paper-Making Machine

Patent No. 2,148,376. William M. Leeson, Glens Falls, N. Y., assignor to The Sandy Hill Iron & Brass Works, Hudson Falls, N. Y., a corporation of New York. Application January 15, 1937, Serial No. 120,744. 1 Claim. (Cl. 92—43). Paper making apparatus comprising in combination, a vat having end walls and spaced relatively fixed rigid longitudinal walls therebetween extending downwardly and inwardly from their upper portions, a cylinder between said walls, supporting plates rotatably supporting the cylinder slidable on the end walls, means associated with the end walls and supporting plates for moving said plates vertically relative to the end walls and means for moving said plates horizontally relative to the end walls, all adapted and arranged whereby said cylinder may be moved towards and away from and up and down relative to the longitudinal walls to vary the space between said cylinder and walls at the sides and bottom of the cylinder, the first named means including blocks slidably guided on the end walls for movements towards and away from one another, links connected at opposite ends to said blocks and to said supporting plates and rotatable actuating members held against axial movements having screw threads formed thereon and engaged in corresponding screw threads formed in said blocks.

Drying Cylinder

Patent No. 2,150,132. Percy R. Sandwell, Montreal, Quebec, Canada, assignor to Dominion Engineering Works Limited, Montreal, Quebec, Canada. Application June 1, 1937, Serial No. 145,814. 5 Claims. (Cl. 34—4). The method evacuating water from a steam heated rotary dryer cylinder which comprises retarding slippage between the water and the cylinder so that the water forms a film around the inside of the cylinder at a balancing speed substantially below the speed at which film formation would ordinarily be established and scooping the water from the lower portion of the cylinder by the aid of a stationary syphoning device through which the water is expelled as the cylinder rotates relative to said device.

Paper Machinery

Patent No. 2,141,273. Herman L. Kutter, Hamilton, Ohio, assignor to The Black-Clawson Company, Hamilton, Ohio, a corporation of Ohio. Application November 15, 1935, Serial No. 49,889. 6 Claims. (Cl. 92—43). A cylinder machine comprising a cylinder mold and a vat therefor, an apron portion in the vat comprising an upper wall portion over which the stock overflows toward the mold terminating at a wall portion following the contour of the mold, said apron portion having a recess extending thereacross between the said wall portions, a rotatably movable member of substantial size extending across the vat within and substantially filling said recess, and a blade extending from the rotatable member and adapted to adjustably vary the flow conditions of the stock upon movement of said rotatable member.

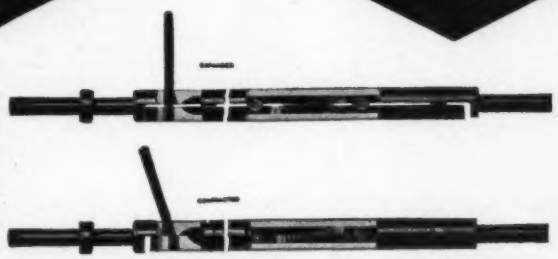
Moisture Control System for Paper Drying Machines and Method

Patent No. 2,148,720. Adam E. Armstrong, Three Rivers, Mich., assignor to Armstrong Machine Works, Three Rivers, Mich. Application March 27, 1936, Serial No. 71,229. 16 Claims. (Cl. 34—48). In a web drier, the combination of a plurality of drier units arranged in series to be successively traversed by the web to be dried, a control unit at the delivery end of the series, means for supplying steam to the units in advance of said control unit, means for delivering steam to said control unit, a steam supply valve for all said units, and means for controlling said steam supply valve including a pressure responsive means operatively associated with the steam delivery means for said control unit.

Appleton Wires are Good wires

Appleton Wire Works, Inc.
Appleton, Wis.

SOLID STEEL WINDER SHAFTS



Shown here in both expanded and contracted positions, Murray Collapsible Winder Shafts have been made for over 20 years. They are easily inserted or removed from the rolls—no sticking or breaking of shafts. Designed to operate freely . . . accurately machined for smoothness and ease of operation . . . will stand abuse and give maximum service . . . made to individual paper machine specifications, to meet individual conditions and in all diameters for any size and width of roll desired. Send us your specifications for quotations.

D. J. Murray Mfg. Co.
WAUSAU ~ WISCONSIN.

Typical repairs and patches, made with Flexco HD Rip Plates

THOUSANDS of men in industrial plants, mines and mills all over the country are doing just what this man is doing. They are cutting costs by repairing conveyor belts with Flexco HD Rip Plates.

WRITE TODAY FOR FOLDER W R P that shows how easy it is to repair rips, to strengthen soft spots and to put in patches by using Flexco HD rip plates. The folder also shows how to make tight butt joints in both conveyor and elevator belts with Flexco HD Belt Fasteners. These fasteners are made in five sizes. Furnished in special analysis steel for general use and in various alloys to meet special conditions.

Flexco HD Rip Plate

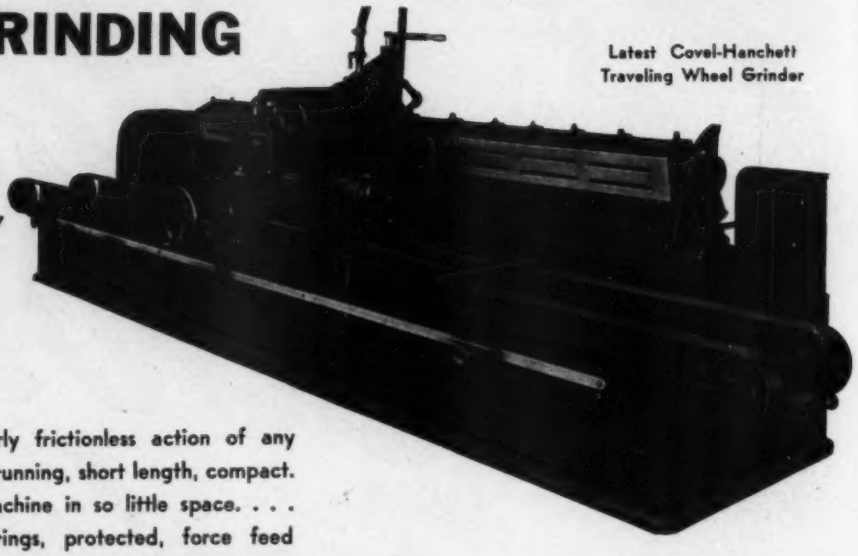
Flexco HD Belt Fastener

FLEXIBLE STEEL LACING CO.
4606 Lexington St., Chicago, Ill.

FLEXCO HD BELT FASTENERS
Sold by supply houses everywhere

KNIFE GRINDING

For Better Cutting Knives, Lower Operating Costs



Latest Covel-Hanchett Traveling Wheel Grinder

Provides the most nearly frictionless action of any grinding service. Smooth running, short length, compact. Never before so much machine in so little space. . . . Preloaded, precision bearings, protected, force feed lubrication. . . . Paper knives and doctor blades reach a new high in accurate, smooth finish with less stock removed, less grinding expense. Sustained accuracy in grinding operations means less grinding for better results; saves knives, wheels and operating cost. . . . Catalogue on request to the Pioneers in the industry.

COVEL-HANCHETT CO.
Big Rapids, Mich., U. S. A.

New Catalogues and Publications

Armstrong Machine Works, Three Rivers, Mich.—Three new bulletins have been published lately by this company. One bulletin has to do with the company's moisture control system, and presents a very interesting story of the operation and features of the system. The other bulletin describes the firm's constant pressure regulator and how it is used with the company's paper machine moisture control system, while the third bulletin describes and illustrates the Armstrong thermal air eliminator, showing its use on a paper machine.

Allis-Chalmers Mfg. Co., Milwaukee, Wis.—A new 28-page booklet (B-6029) containing a great amount of buyer's data never before available on the company's "Lo-Maintenance" motors and "Texrope" drives, has been published recently by this concern. The booklet is, in reality, a ready reference form and will be of special value to industrial engineers, architects, builders, and contractors. It is illustrated throughout.

Baker and Co., Inc., Newark, N. J.—The place of platinum in the chemical industry is described in a very interesting manner in a new publication recently released by Baker and Co., Inc., of Newark, N. J., refiners, workers and distributors of platinum metals.

The publication discusses the advantages of the use of platinum by industry and touches briefly upon some of the outstanding applications of this heat and corrosion-resistant metal. Photographs aid the well-written matter in presenting the story of platinum in connection with the manufacture of nitric acid, glass wool, sulphuric acid, glass insulators, recording and measuring equipment, optical materials, and rayon. Of particular interest regarding the latter product is a photograph of the platinum alloy spinnerettes through which the viscous liquid is extruded under pressure to form rayon.

In addition to this publication, the Baker organization has also published a bibliography of patents on palladium as a catalyst, which reveals the number and diversity of patents presented. Both publications would prove valuable to any chemist, chemical engineer, or anyone engaged in the technical side of industry.

W. A. Jones Foundry & Machine Co., Chicago, Ill.—A new 16-page bulletin just published by this firm covers worm-helical speed reducers—a type of speed reducer developed for vertical shaft drives for agitators, mixers, etc., when a large reduction in speed is required. The bulletin, punched for loose-leaf filing, contains much data relative to the construction, size and assembly of the unit.

Lincoln Electric Co., Cleveland, Ohio.—An extremely interesting bulletin entitled "101 Welding Ideas for Low-Cost Maintenance," has been released recently by this company. The bulletin describes and illustrates a wide variety of money-saving repair, fabrication and structural applications of arc welding. Data for the booklet was gleaned from case studies of 101 maintenance jobs and shows how general repair work was accomplished by the electric arc process. Among the case studies in this bulletin are repair jobs in pulp and paper mills, power plants, steel plants, railroad shops, etc.

Peerless Pump Division, Food Machinery Corporation, Los Angeles, Calif.—An extremely well done piece of work is the new catalogue (127A) on oil or water lubricated pumps published by this company. Sixty pages in length, the catalogue covers the full line of Peerless pumps including water-lubricated turbines, oil-lubricated turbines, propeller pumps, mine pumps, and the new hi-lift pump. The construction, usages, and operation of the pumps are cleverly portrayed, not only by well-written literature and orthodox photographs, but also by the use of folded inserts and hinged partial-page flaps. Colors are used to good advantage throughout. The catalogue is also filled with valuable hydraulic engineering data and this, coupled with the other interesting matter, make the release a thing of value to any industry.

BOOKS

Lange's Handbook of Chemistry—Handbook Publishers, Inc., Sandusky, Ohio, has published a third edition of this valuable, well-known handbook for chemists, technologists, physicists, and others who make use of a reference work of this kind. The new edition has been enlarged and revised. It is a volume of 1850 pages, 5⅝ in. x 7⅝ in., attractively bound in green Fabricoid with cover over-printing in gold. A number of tables in the second edition were rewritten or extended for use in the third edition. Likewise, the following list of tables is presented in the handbook for the first time: physical and mechanical properties of cast metals; reduction of barometer readings to sea level; symbols of thermo and physico-chemical quantities; dimentional formulas; properties of various photographic film emulsions; and comparative photographic emulsion speed ratings. The book is priced at $6.00 a copy by its publisher.

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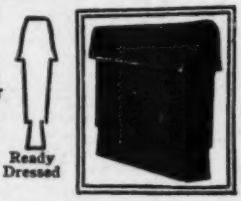
THE MOST ECONOMICAL FILLING THAT CAN BE PUT IN A MORTISE WHEEL



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QUICK SERVICE ON ALL SIZES

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VEST POCKET POWER PLANTS

Small space occupied, any capacity, low over-all operating costs, high and extreme efficiencies, reliability, low initial investment.
Complete power plants to meet any operating conditions of Pulp and Paper mills or other Industrial service. Engineering and Construction.
Satisfactory Services Always Guaranteed.

FERGUSON ENGINEERS

Power Specialists
Monadnock Bldg., Chicago

J. W. HEWITT MACHINE CO., Inc.

Neenah, Wisconsin

Builders of

Paper Making Rolls and Special Machinery

Roll Grinding a Specialty

Said one converter discussing our—

Variable SPEED CLUTCH

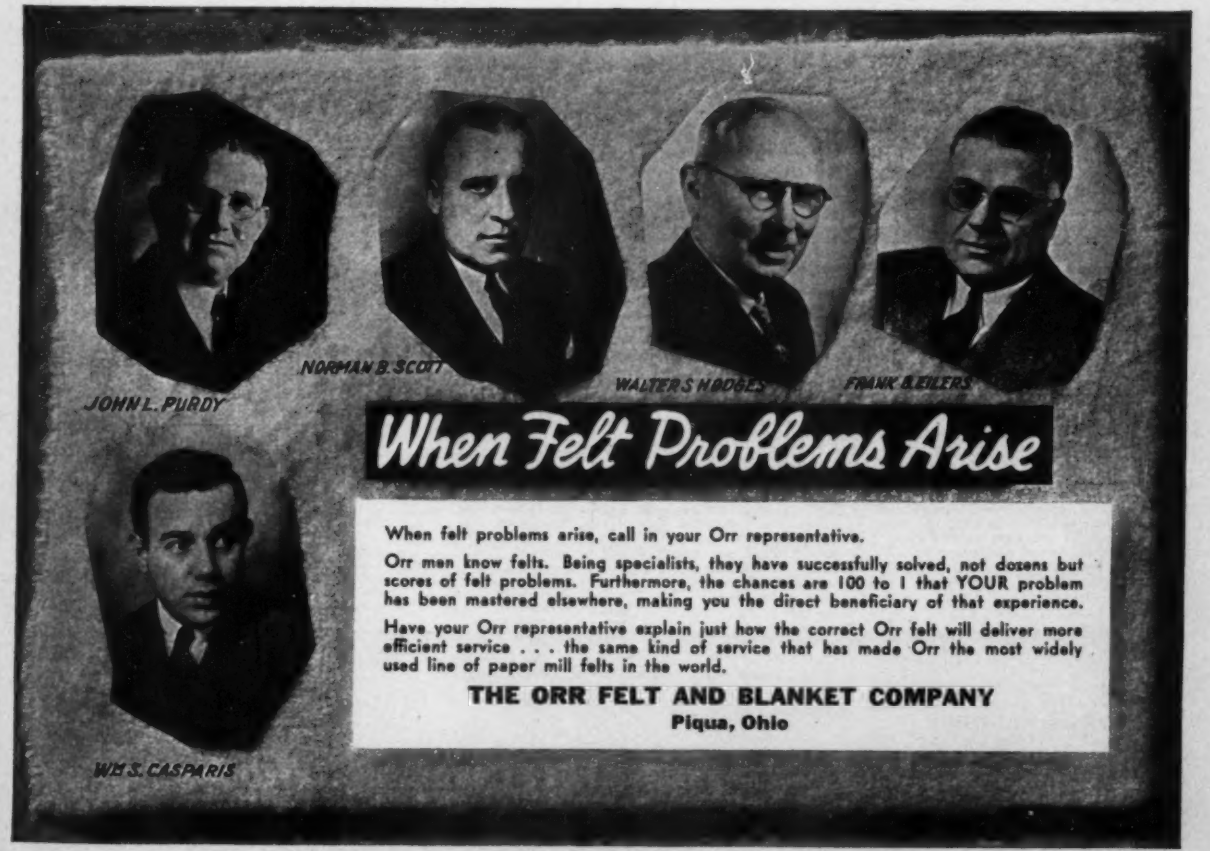
He used it to replace the slip belt drive, on a Dornbusch Embosser, by means of which the speed of the unit was varied.

"We run the machine at any speed desired. Start it slow, increase speed as required, and let it operate on long runs with clutch slipping. It does the work better than we ever expected," says this executive.

We will supply his name if desired. The clutch will solve your troubles just as it did for him.

HUDSON-SHARP

MACHINE CO • GREEN BAY • WIS



When Felt Problems Arise

When felt problems arise, call in your Orr representative.

Orr men know felts. Being specialists, they have successfully solved, not dozens but scores of felt problems. Furthermore, the chances are 100 to 1 that YOUR problem has been mastered elsewhere, making you the direct beneficiary of that experience.

Have your Orr representative explain just how the correct Orr felt will deliver more efficient service . . . the same kind of service that has made Orr the most widely used line of paper mill felts in the world.

THE ORR FELT AND BLANKET COMPANY

Piqua, Ohio

CURRENT MARKET QUOTATIONS

(Owing to Chaotic Market Conditions All Prices Are Nominal)

RAGS (Domestic)
f. o. b. New York City

NEW RAGS	per cwt.
Blue Overalls	5.50 to 5.75
Corduroy	3.00 to 3.25
Cottons—	
Washables, No. 1	2.25 to 2.50
Fancy Percales	3.75 to 4.00
New Soft Blacks	4.00 to 4.25
New Light Seconds	2.00 to 2.25
New Dark Seconds	1.75 to 2.00
Khaki Cuttings—	
Mixed	3.25 to 3.75
O. D.	3.75 to 4.00
New Canvas	8.00 to 8.50
New Mixed Blacks	2.75 to 3.00
Shirt Cuttings—	
New White No. 1	8.00 to 8.25
Silesias No. 1	5.25 to 5.50
New Unbleached	7.75 to 8.00
Fancy	2.50 to 2.75

RAGS (Domestic)
f. o. b. New York City

OLD RAGS	per cwt.
Roofing—	
No. 1	1.75 to 1.85
No. 2	1.60 to 1.70
No. 3	1.50 to 1.60
Twos and Blues—	
Repacked	2.25 to 2.50
Thirds and Blues—	
Repacked	2.00 to 2.25
Miscellaneous	1.75 to 1.90
White, No. 1—	
Repacked	3.50 to 4.00
Miscellaneous	3.00 to 3.25
White, No. 2—	
Repacked	2.75 to 3.00
Miscellaneous	2.00 to 2.25

RAGS (Foreign)
ex dock New York City

NEW RAGS	per cwt.
New Dark Cuttings	Nominal
New Mixed Cuttings	
New Light Silesias	
Light Flannelettes	
Unbleached Cuttings	
New White Cuttings	
New Light Oxfords	
New Light Prints	

RAGS (Foreign)
ex dock New York City

OLD RAGS	per cwt.
No. 1 White Linens	Nominal
No. 2 White Linens	
No. 3 White Linens	
No. 4 White Linens	
No. 1 White Cottons	
No. 2 White Cottons	
No. 3 White Cottons	
No. 4 White Cottons	
Extra Light Prints	
Ord. Light Prints	
Med. Light Prints	
Dutch Blue Cottons	
French Blue Cottons	
French Blue Linens	
Checks and Blues	
Linsey Garments	
Dark Cottons	
Old Shopperies	

ROPE and BAGGING
f. o. b. and ex dock New York City

	per cwt.
Gunny No. 1—	
Foreign	2.00 to 2.25
Domestic	1.75 to 2.00
Wool Tares—	
Light	1.75 to 2.00
Heavy	1.75 to 2.00
Bright Bagging	1.75 to 2.00
Manila Rope—	
Foreign	3.00 to 3.25
Domestic	3.00 to 3.25
New Burlap Cuttings	3.00 to 3.25
Jute Threads—	
Foreign	3.50 to 3.75
Domestic	3.25 to 3.50
Strings—	
Sisal	1.90 to 2.00
Soft jute	2.25 to 2.50
Mixed	.80 to .90

WASTE PAPER
f. o. b. New York City

	per cwt.
Shavings—	
White Envp. Cuttings	2.75 to 3.00
Ord. Hard White No. 1	2.25 to 2.50
Ord. Soft White No. 1	2.00 to 2.25
Soft White, Extra	2.50 to 2.75
Flat Stock—	
Stitchless	1.10 to 1.15
Overissue Mags	1.00 to 1.05
Solid Flat Book	.95 to 1.00
Crumpled No. 1	.85 to .90
Solid Ledger Books	1.75 to 1.80
Ledger Stock—	
White	1.50 to 1.65
Colored	1.10 to 1.20
New B. B. Chips	.55 to .65
Manilas—	
New Env. Cuts	1.80 to 1.90
New Cuttings	1.50 to 1.60
Sulphite Wrappers	.55 to .65
Bogus Wrappers	
No. 1 Old Kraft	1.00 to 1.15
News—	
No. 1 Wh. News Cuttings	1.35 to 1.45
Strictly Overissue	.85 to .90
Strictly Folded	.60 to .70
No. 1 Mixed Paper	.55 to .65

CHEMICALS
f. o. b. shipping point

Alum (Papermakers)—	
Lump, cwt.	3.40 –
Ground, cwt.	3.15 –
Powdered, cwt.	3.55 –
Blanc Fixe—	
Pulp, bulk, ton	40.00 to 45.00
Dry, barrels, pound	.0350 to .0375
Bleaching Powder—	
Drums, cwt.	2.00 to 2.25
Casein (Domestic Standard)—	
20-30 mesh (bags), lb.	20.00 to 21.00
80-100 mesh (bags), lb.	21.00 to 22.00
Argentine, lb.	
China Clay—	
Domestic Filler	
Bulk (mine) ton	6.50 to 12.00
Domestic Coating	
Bulk (mine) ton	11.00 to 20.00
Imported (ship side)	
Bulk (lump) ton	20.00 to 30.00
Chlorine—	
Tank cars (wks) cwt.	1.75 to 1.90
Gelatine (silicin), lb.	.38 to .44
Glyc. (C.P.) drums, lb.	.1250 to .1300
Litharge, powd., bbl., lb.	.08 –
Rosin (Gum)—	
New York, 280 lb. barrel	
E, per bbl.	6.40
F, per bbl.	6.75
G, per bbl.	6.90
WW, per bbl.	7.65
Rosin (Wood), per bbl., carlots	4.00 to 6.80
Salt Cake—	
Dom. bulk (wks) ton	12.00 to 13.50
Imp. bulk on dock—	
(Atl. ports) ton	
Soda Ash—	
Bulk (works) cwt.	.90 to .95
Paper Bags, cwt.	1.05 to 1.35
Barrels, cwt.	1.05 to 1.35
Soda (Caustic)—Ammonia,	
Solid, drums, cwt.	2.30 –
Ground and flake, drums, cwt.	2.75 –
Sodium Silicate—	
60 deg., 55 gal. drums, (works) cwt.	1.65 to 2.00
40 deg., 35 gal. drums, (works) cwt.	.80 to 1.20
Starch—	
Pearl, 140 lb. bags, cwt.	2.60 –
Pearl, barrels, cwt.	2.85 –
Paper (Sp.) bags, cwt.	2.70 –
barrels, cwt.	2.95 –
Sulphur (crude)—	
(mine) bulk, long ton	16.00 to 20.50
Talc—	
Dom. 100 lb. bags (mine) ton	15.00 to 18.00
Imp. bulk, ton	
Titanium Dioxide—	
Barium Pig., bbls., lb.	.05½ to .05¾
Calcium Pig., bbls., lb.	.05¼ to .05½
Zinc Sulphide, bbls., lb.	.07½ to .07¾

CHEMICAL PULP
(Air-dry ton)

	per cwt.
Soda (Dom.) del'd. mill—	
Bleached	2.55 –
Sulphate (Dom.) f. o. b. mill—	
Bleached	2.75 to 3.00
Kraft No. 1	2.00 to 2.25
Kraft, Southern, del.	1.70 to 1.90
Sulphate (Imp.) on dock—	
Bleached	3.00 to 3.25
Kraft No. 1	1.85 to 2.10
Kraft No. 2	1.75 to 1.85
Sulphite (Dom. & For.) On dock—	
Prime bleached	2.50 to 3.00
Prime easy bleach	2.35 to 2.60
Prime strong unbl.	2.00 to 2.40

MECHANICAL PULP
(Air-dry ton)

	per ton
No. 1 Dom. & Can. (f. o. b. mill)	28.00 to 32.00
No. 1 Imp. (On dock)—	
Moist	37.00 to 39.00
Dry	34.00 to 36.00

PAPER
f. o. b. New York City

	per ton
Boards—	
Binders	78.00 to 83.00
Chip	45.00 –
Chip, sgl. mla. lined	55.00 to 60.00
Coated, white patent	
.016	70.00 –
.020 and heavier	65.00 –
Kraft liner	55.00 –
News	45.00 –

	per cwt.
Book (cased)	
No. 1 Glossy Coat	11.30 to 12.75
No. 2 Glossy Coat	9.70 to 11.00
No. 3 Glossy Coat	8.60 to 10.00
No. 4 Glossy Coat	8.05 to 9.25
No. 2 Offset	7.45 to 8.50
A Grade M. F.	6.30 to 8.25
A Grade Super	6.55 to 8.50
B Grade M. F.	5.80 to 7.75
B Grade Super	6.05 to 8.00
C Grade M. F.	5.55 to 7.50
C Grade Super	5.80 to 7.75
D Grade M. F.	5.25 to 7.00
Ivory & India	.50 cwt. extra

	per cwt.
Bonds (Rag Content)—	
100% Rag Ext. No. 1	39.10 to 46.00
100% Rag	31.05 to 36.50
85% Rag	
75% Rag	23.60 to 27.75
65% Rag	20.50 to 25.00
50% Rag	17.55 to 21.50
25% Rag	14.65 to 17.75
Regular Colors	1.00 cwt. extra

	per cwt.
Bonds (Sulphite)—	
No. 1	8.60 to 10.50
No. 2	7.70 to 9.50
No. 3	6.75 to 8.25
No. 4	7.00 to 8.50
Colors	1.00 cwt. extra
Glassine (f. o. b. mill)—	
Embossed (25 lb. up)	12.25 –
Bleached (25 lb. up)	11.25 –
Unbleach. (25 lb. up)	9.50 –
Greaseproof—	
Bleach. (25 lb. up)	9.25 –
Unbleach. (25 lb. up)	8.75 –
Ledgers (Rag Content)—	
100% Rag Ext. No. 1	40.25 to 47.25
100% Rag	32.20 to 37.75
85% Rag	29.90 to 35.00
75% Rag	24.75 to 29.00
65% Rag	21.65 to 26.25
50% Rag	18.70 to 22.75
25% Rag	15.80 to 19.25
Regular Colors	1.00 cwt. extra

	per cwt.
Ledgers (Sulphite)—	
No. 1	9.75 to 12.00
No. 2	8.90 to 10.75
No. 3	7.90 to 10.00
No. 4	8.20 to 10.00

	per ton
News—	
Rolls (Contract)	50.00 –
Rolls (Spot)	(nominal)
Sheets	58.00 –

	per ream
Tissues (Carlots)—	
White, No. 1	.87½ –
White, No. 2	.80 –
Anti-Tarnish M. G.	.67½ –
Colored	.77½ –
Kraft	.67½ –
Manila	.60 –
Napkins, semi-crepe (12½ lb. to M shts.) per cs.	.41 –
Napkins, full crepe and emb'sed (12½ lb. to M shts.) per cs.	.43½ –
Toilet, Bleached (M shts.) per cs.	5.80 –
Toilet, Unbleached (M shts.) per cs.	3.05 –

	per case
Towels—	
Bleached	3.10 to 3.65
Unbleached	1.65 to 3.30

	per cwt.
Wrappings (Kraft)—	
Extra Quality	4.75 to 5.25
Super-Standard	4.25 to 4.75
Northern Standard	4.00 –
Southern Standard	3.62½ –

Wrappings (Sulphite and Bleached Kraft)— (Rolls, f. o. b. mill)	
Bleached papers—	per cwt.
M.F. & M.G. Waxing, 20 lb. (Carloads only)	5.75 –
(10,000 lbs.)	6.00 –
Drug wrapp. 35 lb.	6.00 –
Unbleached Papers—	
Com. Grd. Butch. 40 lb.	4.25 –
No. 1 Butchers	4.50 –
No. 1 Imit. Parch & Dry Fin. Groc. Sulphite 30 lb.	4.875 –
No. 2 Imit. Parch & Dry Fin. Groc. Sulphite 30 lb.	4.625 –
Steam Finish, 50 lb.	3.50 –
Water Finish, 40 lb.	4.25 –
Manilas—	
Envp. Mla., Sub. 16-40 (No. 1)	4.75
Envp. Mla., Sub. 16-28 (No. 2)	4.50 –
Envp. Mla. (Prices based on large sheets untrim'd ream-marked, in bdls.)	
Wrapp. Mla. 35 lb. up—	
No. 1	5.00 –
No. 2	4.75 –
M. G. Sulphite and Kraft (other than Waxing)	
Grade A-25 lb.	5.25 –
Grade B-25 lb.	4.75 –